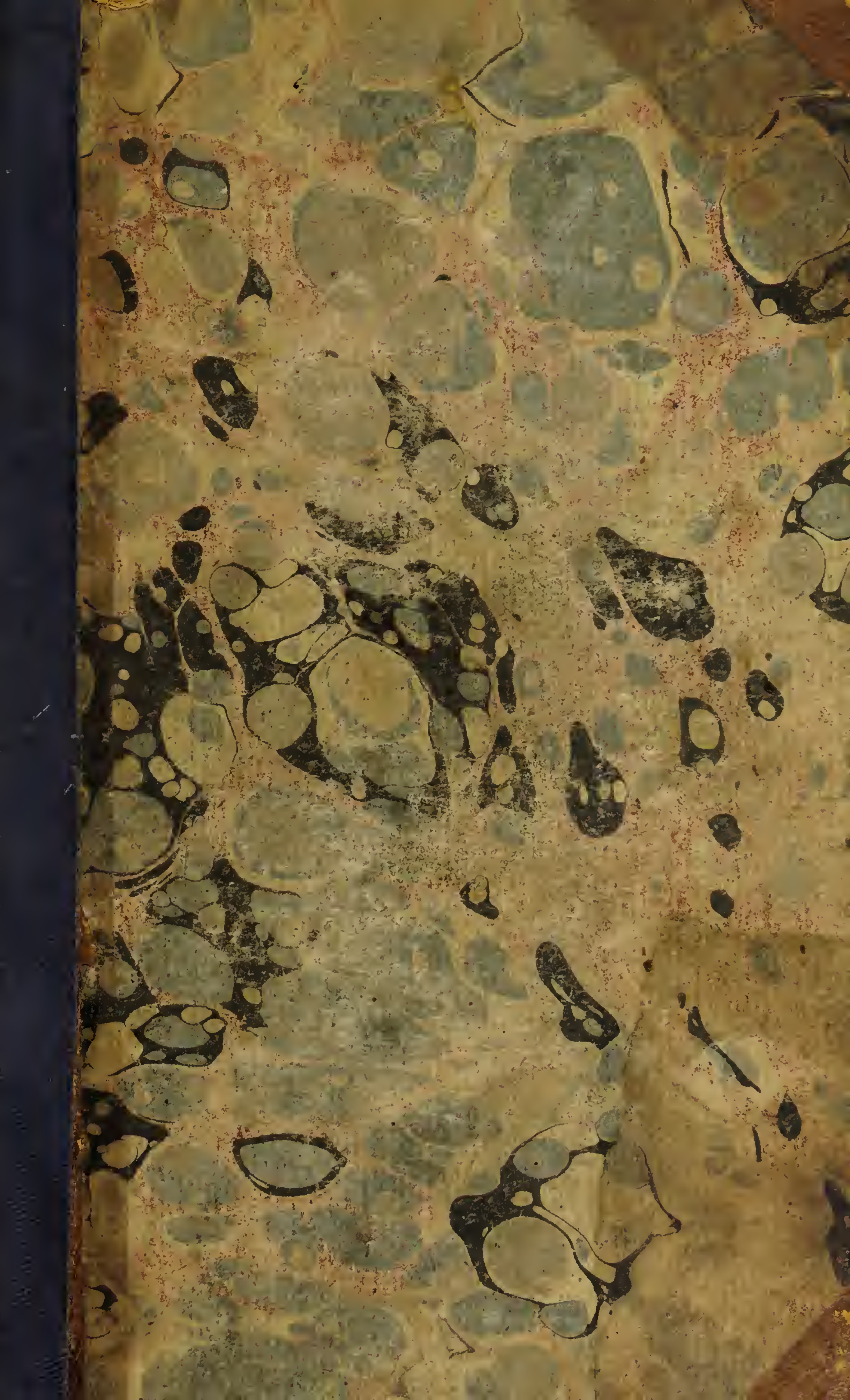

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>
> *Bishop Watson.*

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NATURAL HISTORY.

PART II.

CHAP. I.*

Of Birds in general—Of the Struthious, or Oſtrich order—The OSTRICH—*The Touyou—The* CASSOWARY—*The* DODO—*The Solitory and the Nazarene—Of rapacious Birds—The Golden* EAGLE—*Different Species of Eagles—The Oſprey, &c.—The Condor—The* VULTURE—*The different Species of Vultures—The King Vulture, the Secretary, &c.—The* FALCON—*Deſcription of the Art of Falconry—Species of Falcons and other Hawks—The Kite—The Buzzard—The* SHRIKE, *or Butcher-bird—The Owl—Species of the Owl.*

QUADRUPEDS in their general ſtructure have much relation with that of man; but the ſtructure of birds is in moſt reſpects entirely diſſimilar from both. One obvious mark of diſtinction between this claſs of animals and the quadruped part of the creation is, that inſtead of hair, birds are covered with feathers, and theſe appear to be nouriſhed and kept in order in a different manner from the hair of animals. Leſt the feathers ſhould ſpoil by expoſure to the air, the bird is furniſhed with a gland ſituated on the rump of the animal, containing a proper quantity of oil, which it preſſes out with its beak, and occaſionally anoints its feathers. In water-fowl this oil is ſo plentiful that it even imparts a degree of rancidity to the fleſh, and we ſee that their coat of feathers is rendered by it completely water-proof.

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* In the following account of birds, they are claſſed agreeably to the ſcientific arrangement of *orders*, *genera*, and *ſpecies*. In the contents of the chapters, therefore, the genus is diſtinguiſhed by capitals, and the different ſpecies which are deſcribed, are printed in Italics. Editor.

The wings of birds are remarkably ſtrong. The flap of a ſwan's wing would break a man's leg, and a ſimilar blow from an eagle has been known to lay a man dead in an inſtant.

The ſenſe of ſeeing in birds is remarkably acute, and though they have no external ear, but only two ſmall orifices or ear-holes, yet they do not appear to be deficient in hearing. The ſcent of ſome ſpecies is exquiſitely delicate. In decoys where ducks are caught, the men who attend them generally keep a piece of turf lighted, on which they breathe, leſt the fowl ſhould ſmell them and fly away. The voice of birds is much louder in proportion to their ſize than that of other animals, for in fact, the bellowing of an ox is not louder than the ſcream of a peacock.

The legs, the wings, the bones, and every part of the body, are much lighter, firmer, and more compact in birds than in other creatures. Their lungs are extended all over the cavity of their body.

Carnivorous birds, like carnivorous quadrupeds, have but one ſtomach, and that well calculated for digeſtion. Thoſe that feed on grain have in addition to the crop or ſtomach, where their food is moiſtened or ſwelled, a gizzard, which is a very hard muſcle, almoſt cartilaginous or griſtly, and which they commonly fill with ſmall ſtones, where the food is afterwards ground, in order to its complete digeſtion. Birds are ſubject to few diſeaſes.

Birds of the ſame ſpecies do not always make their neſts of the ſame materials, though in general there is a uniformity; the red-breaſt in ſome parts of England makes its neſt with oak leaves where thoſe leaves are plenty, in other parts it makes it with moſs and hair. Where the eggs are numerous, it is neceſſary to make the neſt warm; thus the wren, which is a ſmall animal, and able to cover but a ſmall compaſs, and yet lays many eggs, makes her neſt remarkably warm; on the contrary the plover, the eagle, the crow, &c. which lay but two or three, are not equally ſolicitous in this reſpect.

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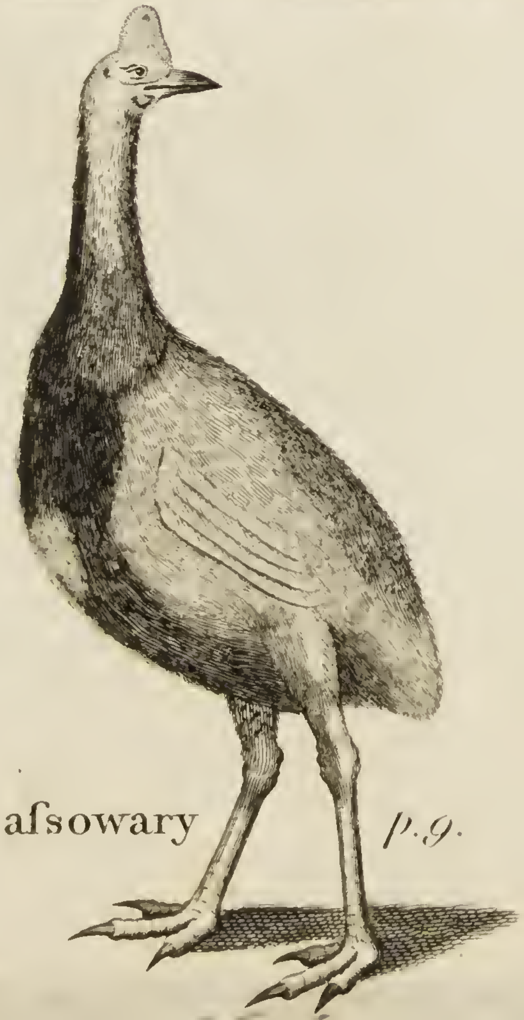
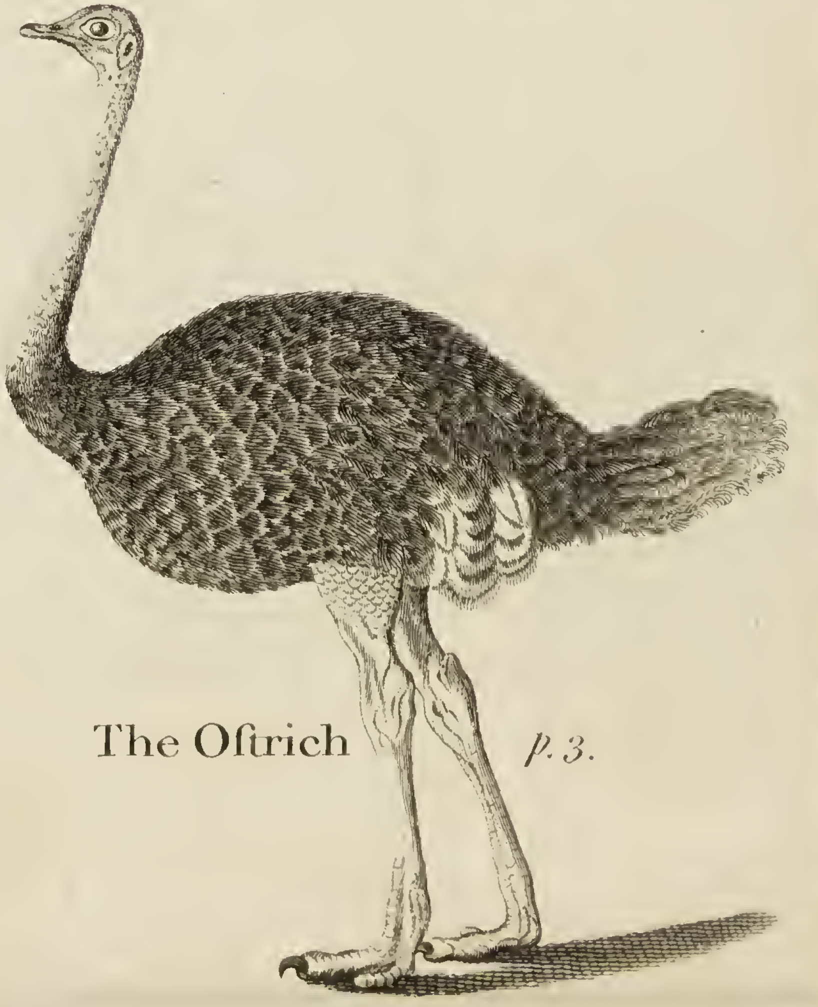


The Caſsowary p. 9.



The Oſtrich p. 3.

There are ſome birds which are called birds of paſſage, and which by migrating make an habitation in all parts of the earth; but in general every climate has birds peculiar to itſelf. In all countries birds are much longer lived than quadrupeds. The ſwan is ſaid to live near three hundred years. They are however greatly inferior to quadrupeds in ſenſe and docility.

As the number of ſpecies in this order of animals is very numerous, amounting to above eight hundred, ſome degree of claſſification appears to be abſolutely neceſſary. We ſhall therefore arrange them in eight orders. The firſt will include the few birds which there are of the ſtruthious, or oſtrich order, or thoſe which never riſe from the earth. The ſecond conſiſts of the rapacious birds; the third is the gallinaceous, or poultry order, at the concluſion of which that which ſome authors have termed the columbine order, or the pigeon, and its varieties, is introduced; the fifth includes the pies; the ſixth the paſſerine, or ſparrow kind; the 7th the cloven-footed water-fowl, including thoſe with pinnated feet; and the eighth the web-footed water-fowl.

Of BIRDS *of the Struthious Order.*

THE OSTRICH (See pl. XLI.) is a bird very anciently known, ſince it is mentioned in the oldeſt of books. It has furniſhed the ſacred writers with ſome of their moſt beautiful imagery, and its fleſh was, even previous to the days of Moſes, apparently a common ſpecies of food, ſince we find it interdicted among other unclean animals by the Jewiſh Legiſlator.

The oſtrich is generally conſidered as the largeſt of birds, but its ſize ſerves to deprive it of the principal excellence of this claſs of animals, the power of flying. The medium weight of this bird may be eſtimated at 75 or 80 pounds, a weight which would require an immenſe power of wing to elevate into the atmoſphere; and hence all thoſe of the feathered kind which approach to the ſize of the oſtrich, ſuch as the touyou, the caſſowary, the dodo neither poſſeſs, nor can poſſeſs the faculty of flight. The head and bill of the oſtrich ſomewhat reſemble thoſe of a duck; and the neck may be compared to that of a ſwan, but that it is much longer; the legs and thighs reſemble thoſe of an hen; though the whole appearance at a diſtance bears a ſtrong reſemblance to that of a camel, it is uſually ſeven feet high from the top of the head to the ground; but from the back it is only four; ſo that the head and neck are above three feet long. From the top of the head to the rump, when the neck is ſtretched out in a right line, it is ſix feet long, and the tail is about a foot more. One of the wings, without the feathers, is a foot and an half; and being ſtretched out, with the feathers, is three feet.

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* This arrangement is perfectly agreeable to that of our author, M. de Buffon, except that we have placed the ſtruthious order firſt, as being moſt conſiderable in magnitude and importance. Editor.

The plumage is much alike in all; that is, generally black and white; though ſome of them are ſaid to be grey. The greateſt feathers are at the extremities of the wings and tail, and the largeſt are generally white. The next row is black and white; and of the ſmall feathers, on the back and belly, ſome are white and others black. There are no feathers on the ſides, nor yet on the thighs, nor under the wings. The lower part of the neck, about half way, is covered with ſtill ſmaller feathers than thoſe on the belly and back; and thoſe, like the former, alſo are of different colours. The head and upper part of the neck are covered with hair.

At the end of each wing, there is a kind of ſpur, almoſt like the quill of a porcupine. It is an inch long, being hollow, and of an horny ſubſtance. There are two of theſe on each wing; the largeſt of which is at the extremity of the bone of the wing, and the other a foot lower. The neck ſeems to be more ſlender in proportion to that of other birds, from its not being furniſhed with feathers.

The thighs are very fleſhy and large, being covered with a white ſkin, inclining to redneſs, and wrinkled in the manner of a net, whoſe meſhes will admit the end of a finger. Some have very ſmall feathers here and there on the thighs; and others again have neither feathers nor wrinkles. The legs are covered before with large ſcales. The end of the foot is cloven, and has two very large toes, which, like the leg, are covered with ſcales. Theſe toes are of unequal ſizes. The largeſt, which is on the inſide, is ſeven inches long, including the claw, which is near three-fourths of an inch in length, and almoſt as broad. The other toe is but four inches long, and is without a claw.

The oſtrich is a native only of the torrid regions of Africa, and has never bred out of that country which firſt produced it. Though, however, the climate of France be much leſs warm than that of Barbary, yet ſome oſtriches have been known to lay in the royal menagery at Verſailles; but the gentlemen of the Academy have in vain attempted to make theſe eggs produce by an artificial proceſs. This bird, ſo diſqualified for ſociety with man, inhabits, from preference, the moſt ſolitary and horrid deſerts, where there are few vegetables to clothe the ſurface of the earth, and where the rain never comes to refreſh it. The Arabians aſſert that the oſtrich never drinks; and the place of its habitation ſeems to confirm the aſſertion. In theſe formidable regions, oſtriches are ſeen in large flocks, which, to the diſtant ſpectator, appear like a regiment of cavalry, and have often alarmed a whole caravan. There is no deſert, how barren ſoever, but is capable of ſupplying theſe animals with proviſion; they eat almoſt every thing; and theſe barren tracts are thus doubly grateful, as they afford both food and ſecurity. The oſtrich is of all animals the moſt voracious. It will devour leather, graſs, hair, iron, ſtones, or any thing that is given. Nor are its powers of digeſtion leſs in ſuch things as are digeſtible. Thoſe ſubſtances which the coats of the ſtomach cannot ſoften, paſs whole; ſo that glaſs, ſtones, or iron, are excluded in the form in which they were devoured. All metals indeed, which are ſwallowed by any animal, loſe a part of their weight, and often the extremities of their figure, from the action of the juices of the ſtomach upon their ſurface. A quarter piſtole, which was ſwallowed by a duck, loſt ſeven grains of its weight in the gizard before it was voided; and it is probable that a ſtill greater diminution of weight would happen in the ſtomach of an oſtrich; conſidered in this light, therefore, this animal may be ſaid to digeſt iron; but ſuch ſubſtances ſeldom remain long enough in the ſtomach of any animal to undergo ſo tedious a diſſolution. The oſtrich lays very large eggs, ſome of them being above five inches in diameter, and weighing above fifteen pounds. Theſe eggs have a very hard ſhell, ſomewhat reſembling thoſe of the crocodile, except that thoſe of the latter are leſs and rounder.

The ſeaſon for laying depends on the climate; in the northern parts of Africa it is about the beginning of July; in the ſouth, it is about the latter end of December. Theſe birds are very prolific, and lay generally from thirty to forty eggs in a ſeaſon, and about twelve at one clutch. It has been commonly reported that the female depoſits them in the ſand; and, covering them up, leaves them to be hatched by the heat of the climate, and then permits the young to ſhift for themſelves. Very little of this however is true: no bird has a ſtronger affection for her young than the oſtrich, and none watches her eggs with greater aſſiduity. It happens, indeed, in thoſe hot climates, that there is leſs neceſſity for the continual incubation of the female; and ſhe more frequently leaves her eggs, which are in no fear of being chilled by the weather: but though ſhe ſometimes forſakes them by day, ſhe always carefully broods over them by night; nor is it more true that they forſake their young after they are excluded the ſhell. On the contrary, the young ones are not even able to walk for ſeveral days after they are hatched. During this time the old ones are very aſſiduous in ſupplying them with graſs, and very careful to defend them from danger: nay, they encounter every danger in their defence.

The ſtrength and ſize of the oſtrich has ſuggeſted to men the experiment of uſing them as animals of burthen. The tyrant Firmius, who reigned in Egypt about the end of the third century, was frequently carried by large oſtriches. Moore, an Engliſh traveller, relates, that he had ſeen at Joar, in Africa, a man travelling on an oſtrich. And Valliſnieri ſpeaks of a young man, who exhibited himſelf upon one of theſe birds at Venice. In fine, M. Adanſon ſaw at the factory at Podor, two oſtriches, which were yet young, of which the ſtronger went at a pace which would have diſtanced the fleeteſt Engliſh race-horſe, with two negroes on its back. Whether this bird could be broken and tamed ſo as to carry its rider with the ſame ſafety and docility as a horſe is a different queſtion; and let it be remembered, that though the oſtriches above-mentioned ran for a ſhort time faſter than a race-horſe, there is no reaſon to believe they could hold out ſo long.

From ancient writers we learn, that whole nations have acquired the name of Struthophagi (oſtrich-eaters) from the preference which they have manifeſted for the fleſh of this bird. Apicius has recommended a peculiar ſauce for the oſtrich, which ſhews at leaſt that it was eaten among the Romans, and at a ſingle feaſt the Emperor Heliogabalus was ſerved with the brains of *ſix hundred* of theſe animals. Even at this period ſome of the ſavage nations of Africa hunt them not only for their plumage, but for their fleſh alſo, which they conſider as a dainty. They ſometimes alſo breed theſe birds tame, to eat the young ones, of which the female is ſaid to be the greateſt delicacy; and a ſingle egg is ſaid to be a ſufficient entertainment for eight men. The ſkin of the oſtrich is ſo thick, that it is uſed for leather by the Arabians; and of the eggs drinking-cups are made. The value of the plumage is well known in moſt countries of Europe.

As the ſpoils of the oſtrich are thus valuable, it is not to be wondered at that man has become their moſt aſſiduous purſuer. For this purpoſe, the Arabians train up their beſt and fleeteſt horſes, and hunt the oſtrich ſtill in view. Perhaps, of all varieties of the chaſe, this, though the moſt laborious, is yet the moſt entertaining. As ſoon as the hunter comes within ſight of his prey, he puts on his horſe with a gentle gallop, ſo as to keep the oſtrich ſtill in ſight; yet not ſo as to terrify him from the plain into the mountains. Upon obſerving himſelf, therefore, purſued at a diſtance, the bird begins to run at firſt, but gently; either inſenſible of his danger, or ſure of eſcaping. In this ſituation he ſomewhat reſembles a man at full ſpeed; his wings, like two arms, keep working with a motion correſpondent to that of his legs; and his ſpeed would very ſoon ſnatch him from the view of his purſuers, but, unfortunately for the ſilly creature, inſtead of going off in a direct line, he takes his courſe in circles; while the hunters ſtill make a ſmall courſe within, relieve each other, meet him at unexpected turns, and keep him thus ſtill employed, ſtill followed for two or three days together. At laſt, ſpent with fatigue and famine, and finding all power of eſcape impoſſible, he endeavours to hide himſelf from thoſe enemies he cannot avoid, and covers his head in the ſand, or the firſt thicket he meets. Sometimes, however, he attempts to face his purſuers: and, though in general the moſt gentle animal in nature, when driven to deſperation, he defends himſelf with his beak, his wings, and his feet. Such is the force of his motion, that a man would be utterly unable to withſtand him in the ſhock.

The ſtruthophagi had another mode of capturing theſe animals. They diſguiſed themſelves in the ſkin of an oſtrich, and putting one of their arms through the neck, they imitated all its motions. By this means they are ſaid to have enabled themſelves to approach and take them at pleaſure. In the ſame manner the ſavages of America diſguiſe themſelves as a roe-buck, in order to ſurpriſe that animal.

The *Touyou*, which many call the American oſtrich, is not an oſtrich, though the travellers who have mentioned it, ſeem to have been more ſolicitous of proving its affinity to that animal, than of deſcribing thoſe peculiarities which diſtinguiſh it from all others of the feathered creation.

It is chiefly found in Guiana, along the banks of the Oroonoko, in the inland provinces of Braſil and Chili, and the vaſt foreſts that border on the mouth of the river Plata. Many other parts of South America were known to have them; but as men multiplied, theſe large and timorous birds either fell beneath their ſuperior power, or fled from their vicinity.

The touyou, though not ſo large as the oſtrich, is only ſecond to it in magnitude. It is by much the largeſt bird in the New Continent; and is generally found to be ſix feet high, meaſuring from its head to the ground. Its legs are three feet long; and its thigh is near as thick as that of a man. Its body is of an oval form, and appears entirely round. It is covered from the back and rump with long feathers; theſe feathers are grey upon the back, and white on the belly, and it has no other tail. It goes very ſwiftly, and ſeems aſſiſted in its motion by a kind of tubercle behind, like an heel, upon which, on plain ground, it treads very ſecurely: in its courſe it uſes a very odd kind of action, lifting up one wing, which it keeps elevated for a time; till letting it drop, it lifts up the other: it runs with ſuch a ſwiftneſs, that the fleeteſt dogs are thrown out in the purſuit. One of them, finding itſelf ſurrounded by the hunters, darted among the dogs with ſuch fury, that they made way to avoid its rage; and it eſcaped, by its amazing velocity, in ſafety to the mountains.

Nieremberg relates, that during incubation, they generally make a falſe neſt at ſome diſtance from the true one; in this they lay two eggs, which are afterwards broken by the old bird, and by attracting a number of flies, beetles, &c. afford a means of ſuſtenance to the young.

When firſt hatched, the young ones are familiar, and follow the firſt perſon they meet. I have been followed myſelf, ſays Wafer, by many of theſe young oſtriches; which at firſt are extremely harmleſs and ſimple: but as they grow older, they become more cunning and diſtruſtful; and run ſo ſwift, that a greyhound can ſcarcely overtake them. Their fleſh, in general, is good to be eaten; eſpecially if they be young. It would be no difficult matter to rear up flocks of theſe animals tame, particularly as they are naturally ſo familiar: and they might be found to anſwer domeſtic purpoſes, like the hen or the turkey. Their maintenance could not be expenſive, if, as Narborough ſays, they live entirely upon graſs.

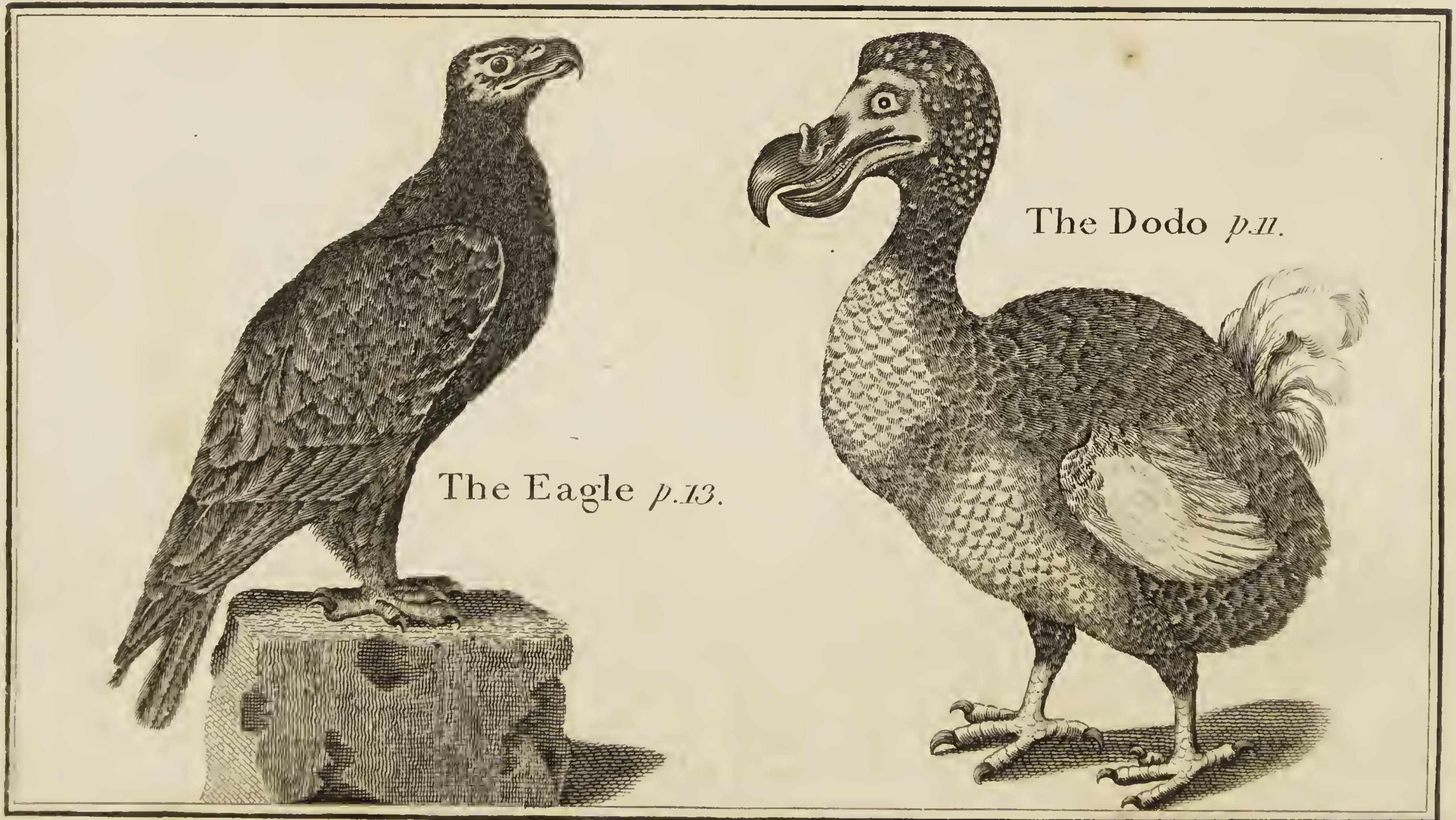
THE CASSOWARY (See pl. XLI.) is a bird which was firſt brought into Europe by the Dutch, from Java, in the Eaſt-Indies, in which part of the world it is only to be found.

The caſſowary, though not ſo large as the former, yet appears more bulky to the eye; its body being nearly equal, and its neck and legs much thicker and ſtronger in proportion; this conformation gives it an air of ſtrength and force, which the fierceneſs and ſingularity of its countenance conſpire to render formidable. That which has been deſcribed by the gentlemen of the Academy was five feet and an half from the point of the bill to the extremity of the claws; and the legs were two feet and an half high, from the belly to the end of the claws. The wing is ſo ſmall, that it does not appear; being hid under the feathers of the back. In other birds, a part of the feathers ſerve for flight, and are different from thoſe that ſerve for mere covering; but in the caſſowary, all the feathers are of the ſame kind, and outwardly of the ſame colour. They are generally double; having two long ſhafts, growing out of a ſhort one, which is fixed in the ſkin. The beards that adorn the ſtem or ſhaft, are from about half way to the end, very long, and as thick as an horſe-hair, without being ſubdivided into fibres. The ſtem or ſhaft is flat, ſhining, black, and knotted below; and from each knot there proceeds a beard: likewiſe, the beards at the end of the large feathers are perfectly black; and towards the root of a grey tawny colour; ſhorter, more ſoft, and throwing out fine fibres, like down; ſo that nothing appears except the ends, which are hard and black; becauſe the other part, compoſed of down, is quite covered. There are feathers on the head and neck; but they are ſo ſhort, and thinly ſown, that the bird's ſkin appears naked, except towards the hinder part of the head, where they are a little longer. The wings, when they are deprived of their feathers, are but three inches long. The ends of the wings are adorned with five prickles, of different lengths and thickneſs, which bend like a bow: theſe are hollow from the roots to the very points, having only that ſlight ſubſtance within, which all quills are known to have. The longeſt of theſe prickles is eleven inches; and it is a quarter of an inch in diameter at the root, being thicker there than towards the extremity; the point ſeems broken off.

The part, however, which moſt diſtinguiſhes this animal is the head; this, though ſmall, like that of an oſtrich, does not fail to inſpire ſome degree of terror. It is bare of feathers, and is in a manner armed with an helmet of horny ſubſtance, that covers it from the root of the bill to near half the head backwards. This helmet is black before and yellow behind. Its ſubſtance is very hard, being formed by the elevation of the bone of the ſkull; and it conſiſts of ſeveral plates, one over another, like the horn of an ox. Some have ſuppoſed that this was ſhed every year with the feathers; but the moſt probable opinion is, that it only exfoliates ſlowly like the beak. To the peculiar oddity of this natural armour may be added the colour of the eye in this animal, which is a bright yellow, and the globe being above an inch and an half in diameter, give it an air equally fierce and extraordinary. At the bottom of the upper eye-lid, there is a row of ſmall hairs, over which there is another row of black hair, which look pretty much like an eye-brow. The ſides of the head, about the eye and ear, being deſtitute of any covering, are blue, except the middle of the lower eye-lid, which is white. The neck is of a violet colour, inclining to that of ſlate; and it is red behind in ſeveral places, but chiefly in the middle. About the middle of the neck before, at the riſe of the large feathers, there are two projections formed by the ſkin, which reſemble ſomewhat the gills of a cock, but that they are blue as well as red. The ſkin which covers the fore-part of the breaſt, on which this bird leans and reſts, is hard, callous, and without feathers. The thighs and legs are covered with feathers, and are extremely thick, ſtrong, and ſtraight; but the legs are thicker a little above the foot than in any other place. The toes are covered with ſcales, and are but three in number; for that which ſhould be behind is wanting.

Thus formed for a life of hoſtility, for terrifying others, and for its own defence, it might be expected that the caſſowary was one of the moſt fierce and terrible animals of the creation. But nothing is ſo oppoſite to its natural character, nothing

Plate 1/2.



The Eagle *p.13.*

The Dodo *p.11.*

nothing ſo different from the life it is contented to lead. It never attacks others; and inſtead of the bill, when attacked, it rather makes uſe of its legs, and kicks like an horſe, or runs againſt its purſuer, beats him down, and treads him to the ground.

The manner of going of this animal is not leſs extraordinary than its appearance. Inſtead of going directly forward, it ſeems to kick up behind with one leg, and then making a bound onward with the other, it goes with ſuch prodigious velocity, that the ſwifteſt racer would be left far behind.

The ſame degree of voraciouſneſs which we perceived in the oſtrich, obtains as ſtrongly here. The caſſowary ſwallows every thing that comes within the capacity of its gullet. The Dutch aſſert, that it can devour not only glaſs, iron, and ſtones, but even live and burning coals, without teſtifying the ſmalleſt fear, or feeling the leaſt injury. It is ſaid that the paſſage of the food through its gullet is performed ſo ſpeedily, that even the very eggs which it has ſwallowed whole, paſs through it unbroken, in the ſame form they went down. The caſſowary's eggs are of a grey aſh colour, inclining to green. The largeſt is found to be fifteen inches round one way, and about twelve the other. The voice of this bird reſembles the grunting of a hog.

The ſouthern parts of the moſt eaſtern Indies ſeem to be the natural climate of the caſſowary. His domain, if we may ſo call it, begins where that of the oſtrich terminates. The latter has never been found beyond the Ganges; while the caſſowary is never ſeen nearer than the iſlands of Banda, Sumatra, Java, the Molucca Iſlands, and the correſponding parts of the continent.

THE DODO. (See pl. XLII.) Swiftneſs is generally conſidered as the peculiar attribute of birds, but the dodo, inſtead of exciting that idea by its appearance, ſeems to ſtrike the imagination as a thing the moſt unwieldy and inactive of all nature. Its body is maſſive, almoſt cubical, and covered with grey feathers; it is juſt barely ſupported upon two ſhort thick legs like pillars. The neck, thick and purſy, is joined to the head, which conſiſts of two great chaps, that open far behind the eyes which are large, black and prominent; ſo that the animal, when it gapes, ſeems to be all mouth. The bill therefore is of an extraordinary length, not flat and broad, but thick, and of a bluiſh white, ſharp at the end, and each chap crooked in oppoſite directions. From all this reſults a ſtupid and voracious phyſiognomy; which is ſtill more encreaſed by a bordering of feathers round the root of the beak, and which give the appearance of an hood or cowl. The dodo is furniſhed with wings, covered with ſoft aſh-coloured feathers, but they are too ſhort to aſſiſt it in flying. It is furniſhed with a tail, with a few ſmall curled feathers; but this tail is diſproportioned and diſplaced. Its legs are too ſhort for running, and its body too fat to be ſtrong.

This bird is a native of the Iſle of France; and the Dutch, who firſt diſcovered it there, called it in their language the *nauſeous bird*, as well from its diſguſting figure, as from the bad taſte of its fleſh. However, ſucceeding obſervers contradict this firſt report, and aſſert that its fleſh is good and wholeſome eating. It is a ſimple bird, and is very eaſily taken. Three or four dodos are enough to dine an hundred men.

The Solitary, and the Nazarene.]——The firſt of theſe is a large bird, which inhabits the Iſle of Roderique, and receives its name from its ſolitary habits, ſcarcely more than two being ever found together. The male is ſaid to weigh ſometimes forty-five pounds. It has ſome relation to the turkey, but its bill is more bent, and it ſtands higher on its legs than that bird. The colour of its plumage is grey and brown mixed, and it has ſcarcely any tail. The wings are too ſhort for flight, and the bone of the pinion ſwells out into a kind of round knob. The females are ſometimes covered with light yellow feathers, and they have alſo a widow's peak above the bill. They lay only one egg, and ſit ſeven weeks. It is ſaid that a ſtone is always found in the gizzard both of this bird and the dodo, it is, however, probably only of the ſame kind, and for the ſame purpoſe, as thoſe which are found in all granivorous birds, and ſerves merely to prove them of that kind. They are hunted from March to September, and being then very fat, the young ones are much eſteemed as food.

The *nazarene* is found at preſent in the Iſle of France, though it evidently takes its name from having been originally a native of the Iſle of Nazareth. It is larger than the ſwan, with the bill bent a little downwards. Inſtead of feathers, it is covered with black down; but the wings are feathered, and there are ſome frizzled feathers on the rump. The legs are ſcaly with three toes to each foot. The female lays but one egg.

Both theſe laſt mentioned birds have much affinity with the dodo, if indeed they be any more than ſimple varieties.

Of rapacious Birds.

THE GOLDEN EAGLE (See pl. XLII.) is the largeſt and the nobleſt of all thoſe birds that have received the name of eagle. The length of the female is three feet and a half; the extent of its wings, eight and a half; it weighs from ſixteen to eighteen pounds; but the male ſeldom weighs more than twelve pounds *. Its bill is three inches long, and of a deep blue; and the eye of a very brilliant hazel colour. The ſight and ſenſe of ſmelling are very acute. The head and neck are clothed with narrow, ſharp pointed feathers, of a deep brown colour, bordered with tawny; but thoſe on the crown of the head, in very old birds, turn grey. The whole body, above as well as beneath, is of a dark brown; and the feathers of the back are finely clouded with a deeper ſhade of the ſame. The wings when clothed reach to the end of the tail. The quill feathers are of a chocolate colour, the ſhafts white. The tail is of a deep brown, irregularly barred and blotched with an obſcure aſh-colour, and uſually white at the roots of the feathers. The legs are yellow, ſhort, and very ſtrong, being three inches in circumference, and feathered to the very feet. The toes are covered with large ſcales, and armed with the moſt formidable claws, the middle of which are two inches long.

In the rear of this terrible bird follow the *ring-tailed eagle*, the *common eagle*, the *bald eagle*, the *white eagle*, the *rough-footed eagle*, the *erne*, the *black eagle*, the *oſprey*, the *ſea eagle*, the *crowned eagle*, &c. Theſe, and others that might be added, form different ſhades in this fierce family; but have all the ſame rapacity, the ſame general form, the ſame habits, and the ſame manner of bringing up their young.

In general, theſe birds are found in mountainous and ill-peopled countries, and breed among the loftieſt cliffs. They chooſe thoſe places which are remoteſt from man, upon whoſe poſſeſſions they but ſeldom make their depredations, being contented rather to follow the wild game in the foreſt, than to riſque their ſafety to ſatisfy their hunger.

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* Among birds of prey the female is generally larger than the male.

It requires great patience and much art to tame an eagle; and even though taken young, and brought under by long aſſiduity, yet ſtill it is a dangerous domeſtic, and often turns its force againſt its maſter. When brought into the field for the purpoſes of fowling, the falconer is never ſure of its attachment: that innate pride, and love of liberty, ſtill prompt it to regain its native ſolitudes; and the moment the falconer ſees it, when let looſe, firſt ſtoop towards the ground, and then riſe perpendicularly into the clouds, he gives up all his former labour for loſt; quite ſure of never beholding his late priſoner more. Sometimes, however, they are brought to have an attachment for their feeder: they are then highly ſerviceable, and liberally provide for his pleaſures and ſupport. When the falconer lets them go from his hand, they play about and hover round him till their game preſents, which they ſee at an immenſe diſtance, and purſue with certain deſtruction.

Of all animals the eagle flies higheſt, and on this account he was called by the ancients the bird of Jove. Of all birds alſo, he has the quickeſt eye; but his ſenſe of ſmelling is far inferior to that of the vulture. He never purſues, therefore, but in ſight; and when he has ſeized his prey, he ſtoops from his height, as if to examine its weight, always laying it on the ground before he carries it off. As his wing is very powerful, yet, as he has but little ſuppleneſs in the joints of the leg, he finds it difficult to riſe when down; however, if not inſtantly purſued, he finds no difficulty in carrying off geeſe and cranes. He alſo carries away hares, lambs, and kids; and often deſtroys fawns and calves, to drink their blood, and carries a part of their fleſh to his retreat. Infants themſelves, when left unattended, have been deſtroyed by theſe rapacious creatures; which probably gave riſe to the fable of Ganymede's being ſnatched up by an eagle to heaven.

An inſtance is recorded in Scotland of two children being carried off by eagles; but fortunately they received no hurt by the way; and, the eagles being purſued, the children were reſtored unhurt out of the neſts to the affrighted parents.

The eagle is thus at all times a formidable neighbour; but peculiarly ſo when bringing up its young. It is then that the female, as well as the male, exert all their force and induſtry to ſupply their young. Smith, in his Hiſtory of Kerry, relates, that a poor man in that country got a comfortable ſubſiſtence for his family, during a ſummer of famine, out of an eagle's neſt, by robbing the eaglets of food, which were plentifully ſupplied by the old ones. He protracted their aſſiduity beyond the uſual time, by clipping the wings, and retarding the flight of the young.

It happened ſome time ago, in the ſame country, that a peaſant reſolved to rob the neſt of an eagle, that had built in a ſmall iſland, in the beautiful lake of Killarney. He accordingly ſtripped, and ſwam in upon the iſland, while the old ones were away; and, robbing the neſt of its young, he was preparing to ſwim back, with the eaglets tied in a ſtring; but, while he was yet up to his chin in the water, the old eagles returned, and, miſſing their young, quickly fell upon the plunderer, and, in ſpite of all his reſiſtance, diſpatched him with their beaks and talons.

In order to extirpate theſe pernicious birds, there is a law in the Orkney Iſlands, which entitles any perſon that kills an eagle to a hen out of every houſe in the pariſh in which the plunderer is killed.

The neſt of the eagle is uſually built in the moſt inacceſſible cliff of the rock, and often ſhielded from the weather by ſome jutting cragg that hangs over it. Sometimes, however, it is wholly expoſed to the winds, as well ſide-ways as above; for the neſt is flat, though built with great labour. It is ſaid that the ſame neſt ſerves the eagle during life; and indeed the pains beſtowed in forming it ſeems to argue as much. It is aſſerted, that as ſoon as the young ones are ſomewhat grown, the mother kills the moſt feeble or the moſt voracious. If this happens, it muſt proceed only from the neceſſities of the parent, who is incapable of providing for their ſupport; and is content to ſacrifice a part to the welfare of the majority.

The plumage of the eaglets is not ſo ſtrongly marked as when they come to be adult. They are at firſt white; then inclined to yellow; and at laſt of light brown. Age, hunger, long captivity, and diſeaſes, make them whiter. It is ſaid, that they live above an hundred years: and that they at laſt die, not of old age, but from the beak's turning inward upon the under mandible, and thus preventing their taking any food. They are indeed equally remarkable, for their longevity, and for their power of ſuſtaining a long abſence from food. One of this ſpecies, which was lately nine years in the poſſeſſion of Mr. Owen Holland, of Conway, lived thirty-two years with the gentleman who made him a preſent of it; but what its age was when the latter received it from Ireland, is unknown. The ſame bird alſo furniſhes a proof of the truth of the other remark; having once, through the neglect of ſervants, endured hunger for twenty-one days, without any ſuſtenance whatever. But this is ſtill leſs extraordinary than an inſtance recorded by our author, M. de Buffon, who was aſſured, by a perſon of veracity, that one of theſe birds being caught in a fox-trap, exiſted for five entire weeks without any aliment. It ſhewed no appearance of languor till the laſt eight days, and it was killed at length in order to deliver it from its ſufferings. The eagle ſeldom drinks, as its principal aliment is raw fleſh, which contains in itſelf a ſufficient quantity of moiſture.

Such are the general characteriſtics and habitudes of the eagle; however, in ſome theſe habitudes differ, as the ſea eagle and the oſprey live chiefly upon fiſh, and, conſequently, build their neſts on the ſea-ſhore, and by the ſides of rivers, on the ground among reeds; and often lay three or four eggs, rather leſs than thoſe of a hen, of a white elliptical form. They catch their prey, which is chiefly fiſh, by darting down upon them from above. The Italians compare the violent deſcent of theſe birds on their prey, to the fall of lead into water; and call them by the name of aquila piombina, or the leaden eagle.

Nor is the bald eagle, which is an inhabitant of North Carolina, leſs remarkable for habits peculiar to itſelf. Theſe birds fly very heavily; ſo that they cannot overtake their prey, like others of the ſame denomination. To remedy this, they often attend the oſprey, which they attack as ſoon as it has ſeized a fiſh; the oſprey, therefore, being glad to eſcape by dropping the fiſh, with aſtoniſhing dexterity this bird ſeizes the unmerited prey, before it reaches the water.

Theſe eagles alſo generally attend upon fowlers in the winter; and when any birds are wounded, they are ſure to be ſeized by the eagle, though they may fly from the fowler. This bird will often alſo ſteal young pigs, and carry them alive to the neſt, which is compoſed of twigs, ſticks, and rubbiſh: it is large enough to fill the body of a cart; and is commonly full of bones half eaten, and putrid fleſh, the ſtench of which is intolerable.

The diſtinctive marks of each ſpecies are as follow.

The *golden eagle:* of a tawny, iron colour; the head and neck of a reddiſh iron; the tail feathers of a dirty white, marked with croſs bands of tawny iron; the legs covered with tawny iron feathers.

The *common eagle:* of a brown colour: the head and upper part of the neck inclining to red; the tail-feathers white, blackening at the ends; the outer ones, on each ſide, of an aſh colour, the legs covered with feathers of a reddiſh brown. This eagle was called by the Greeks the *hare-killer*, as, though that animal is a common prey to all eagles, it is the uſual and particular object of purſuit with this ſpecies.

The *bald eagle:* brown: the head, neck, and tail feathers white; the feathers of the upper part of the leg brown. Its length is three feet three inches. Inhabits both Europe and America.

The *white eagle:* the whole white. But probably all white eagles are only varieties.

The *rough-footed eagle:* of a dirty brown: ſpotted under the wings, and on the legs, with white: the feathers of the tail white at the beginning and the point; the leg-feathers dirty brown, ſpotted with white. This eagle is very ſmall, being not more than two feet and a half in length. It is remarkable for its plaintive cry.

The *white-tailed eagle:* dirty brown: head white; the ſtems of the feathers black; the rump inclining to black; the tail-feathers, the firſt half black, the end half white; legs naked.

The *erne:* a dirty iron colour above, an iron mixed with black below; the head and neck aſh, mixed with cheſnut; the points of the wings blackiſh, the tail-feathers white; the legs naked.

The *black or ring-tailed eagle:* blackiſh: the head and upper neck mixed with red; the tail-feathers, the firſt half white, ſpeckled with black; the other half, blackiſh; the leg-feathers dirty white. It inhabits Europe.

The *ſea eagle:* inclining to white, mixed with iron brown; belly white, with iron-coloured ſpots; the covert feathers * of the tail whitiſh; the tail-feathers black at the extremity; the upper part of the leg-feathers of an iron brown. It is ſomewhat ſmaller than the golden eagle, and is found in moſt parts of the world.

The *oſprey:* brown above; white below; the back of the head white; the outward tail-feathers, on the inner ſide, ſtreaked with white; legs naked. It is nearly as large as the golden eagle.

The *jean le blanc:* above, browniſh grey; below, white, ſpotted with tawny brown; the tail-feathers on the outſide, and at the extremity, brown; on the inſide, white, ſtreaked with brown; legs naked. Its length is about two feet, and it weighs from three pounds four ounces to three pounds ſeven ounces. It is common in France, but is rarely known elſewhere. It makes its neſt on the ground among heath, &c.

The *eagle of Braſil:* blackiſh brown: aſh colour, mixed in the wings; tail-feathers white; legs naked.

The *Oroonoko eagle:* with a topping, above, blackiſh brown; below, white, ſpotted with black; upper neck yellow; tail-feathers brown, with white circles; leg-feathers white, ſpotted with black.

The *crowned African eagle*, with a topping: the tail of an aſh-colour, ſtreaked on the upper ſide with black.

The *eagle of Pondicherry:* cheſnut colour, the ſix outward tail-feathers black one half.

Beſides theſe, authors have enumerated the *Chineſe eagle*, which is a moſt beautiful bird, of a reddiſh brown, with a bar of dark brown acroſs the middle of the wing; the *white-bellied eagle*; the *Japoneſe eagle*, which is finely variegated; the *oriental eagle*; the *Javan eagle*; the *fierce eagle*, from Aſtracan; the *plaintive eagle*, from Terra del Fuego; the *black-cheeked eagle*; the *ſpotted eagle*; the *ſtatenland eagle*; the *Ruſſian and equinoctial eagles*, and the *Mansfeury*.

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* The coverts are the ſhorter feathers, which hide the baſe of the quill feathers. On the wings there are the leſſer, the greater, and the under-wing coverts. The *leſſer coverts* are ſmall feathers which lie in ſeveral rows on the bones of the wings; the *greater coverts* are thoſe which lie immediately over the quills, as well as over the *ſecondaries*, or quills of the ſecond joint; the *under coverts* line the inſide of the wings. One term more it may be proper to explain, that is, the *ſcapulars*, which are the feathers that riſe from the ſhoulders and cover the ſides of the back. Editor.

Moſt of theſe take their names from their characteriſtic quality; and, indeed, minutely to deſcribe them would greatly extend the volume, without adding much to the entertainment of the reader.

THE CONDOR.] Of all the birds which are endowed with the power of flight, the condor muſt be allowed univerſally to be the largeſt. It alſo poſſeſſes, in an higher degree than any of the feathered tribe, all the qualities that render it formidable, not only to animals of its own kind, but to beaſts, and even to man himſelf. It is eighteen feet acroſs the wings when extended. The beak is ſo ſtrong as to pierce the body of a cow; and two of them are able to devour it. They do not even abſtain from man himſelf: but fortunately there are but few of the ſpecies. The Indians aſſert, that they will carry off a deer, or a young calf, in their talons, as eagles would an hare or a rabbit. They ſeldom frequent the foreſts, as they require a large ſpace for the diſplay of their wings; but are found on the ſea-ſhore, and the banks of rivers, whither they deſcend, at certain ſeaſons, from their heights of the mountains. Condamine has frequently ſeen them in ſeveral parts of the mountains of Quito, and obſerved them hovering over a flock of ſheep; and he thinks they would, at a certain time, have attempted to carry one off, had they not been ſcared away by the ſhepherds. The condor is of a brown colour; round the neck they have often a white ruff; and on their head a brown comb, which however is not indented like that of a cock. It has by moſt naturaliſts been claſſed among the vultures, on account of its neck and head, which are bare of feathers; but if we judge by its natural habits, and internal qualities, we ſhould rather place it among the eagles, whom it rivals in fierceneſs as well as in courage.

It is doubted whether this animal be proper to America only, or whether it may not have been deſcribed by the naturaliſts of other countries. It is ſuppoſed, that the great bird, called the rock, deſcribed by Arabian writers, and ſo much exaggerated by fable, is but a ſpecies of the condor. The great bird of Tarnaſſar, in the Eaſt Indies, which is larger than the eagle, as well as the vulture of Senegal, which carries off children, are probably no other than the bird we have been deſcribing. Ruſſia, Lapland, and even Switzerland and Germany, are ſaid to have known this animal. In the deſerts of Pachomac, where it is chiefly ſeen, men ſeldom venture to travel. Thoſe wild regions are very ſufficient of themſelves to inſpire a ſecret horror: broken precipices——prowling panthers——foreſts only vocal with the hiſſing of ſerpents——and mountains rendered ſtill more terrible by the condor, the only bird that ventures to make its reſidence in thoſe deſerted ſituations.

THE VULTURE.] The firſt rank among birds of prey has been aſſigned to the eagle, not becauſe it is larger than the vulture, but becauſe it is more noble and courageous; and poſſeſſes, at leaſt, as much an inclination for war as an appetite for prey: the vulture is deficient in all the more reſpectable qualities of the eagle, and only rivals it in ſize, in ſtrength, and rapacity.

Vultures may be eaſily diſtinguiſhed from all thoſe of the eagle kind, by the nakedneſs of their heads and necks, which are without feathers, and only covered with a very ſlight down, or a few ſcattered hairs. Their eyes are more prominent; thoſe of the eagle being buried more in the ſocket. The claws are ſhorter, and leſs hooked. The inſide of the wing is covered with a thick down, which is different in them from all other birds of prey. Their attitude is not ſo upright as that of the eagle; and their flight more difficult and heavy.

They are ſtill more ſtrongly marked by their nature, which in all vultures is cruel, unclean, and indolent. Their ſenſe of ſmelling, however, is amazingly great; and Nature, for this purpoſe, has given them two large apertures or noſtrils without, and an extenſive olfactory membrane within. They ſeem adapted inwardly, not only for being carnivorous, but to eat corn, or whatever of that kind comes in their way.

This bird, which is common in many parts of Europe, and but too well known on the weſtern continent, is totally unknown in England. In Egypt, Arabia, and many other kingdoms of Africa and Aſia, vultures are found in great abundance. The inſide down of their wing is converted into a very warm and comfortable kind of fur, and is commonly ſold in the Aſiatic markets.

In Egypt, indeed, this bird ſeems to be of ſingular ſervice. There are great flocks of them in the neighbourhood of Grand Cairo, which no perſon is permitted to deſtroy.

The ſervice they render the inhabitants, is devouring all the carrion and filth of that great city; which might otherwiſe tend to corrupt and putrefy the air. They are commonly ſeen in company with the wild dogs of the country, tearing a carcaſs very deliberately together. This odd aſſociation produces no quarrels; the birds and quadrupeds ſeem to live amicably, and nothing but harmony ſubſiſts between them. The wonder is ſtill the greater, as both are extremely rapacious, and both lean and bony to a very great degree; probably having no great plenty even of the wretched food on which they ſubſiſt.

In America, they lead a life ſomewhat ſimilar. Wherever the hunters, who there only purſue beaſts for the ſkins, are found to go, theſe birds are ſeen to purſue them. They ſtill keep hovering at a little diſtance; and when they ſee the beaſt flayed and abandoned, they call out to each other, pour down upon the carcaſs, and, in an inſtant, pick its bones as bare and clean as if they had been ſcraped by a knife.

The ſloth, the filth, and the voraciouſneſs of theſe birds, almoſt exceed credibility. In the Braſils, where they are found in great abundance, when they light upon a carcaſs, which they have liberty to tear at their eaſe, they ſo gorge themſelves that they are unable to fly; but keep hopping along when they are purſued. At all times, they are a bird of ſlow flight, and unable readily to raiſe themſelves from the ground; but, when they have overfed, they are then utterly helpleſs; but they ſoon get rid of their burthen; for they have a method of vomiting up what they have eaten, and then they fly off with greater facility.

It is pleaſant to be a ſpectator of the hoſtilities between animals that are thus hateful or noxious. Of all creatures, the two moſt at enmity, is the vulture of Braſil, and the crocodile. The female of this terrible amphibious creature, which in the rivers of that part of the world grows to the ſize of twenty-ſeven feet, lays its eggs, to the number of one or two hundred, in the ſands, on the ſide of the river, where they are hatched by the heat of the climate. For this purpoſe, ſhe takes every precaution to hide from all other animals the place where ſhe depoſits her burthen: in the mean time, a number of vultures, ſit, ſilent and unſeen, in the branches of ſome neighbouring foreſt, and view the crocodile's operations, with the pleaſing expectation of ſucceeding plunder. They patiently wait till the crocodile has laid the whole number of her eggs, till ſhe has covered them carefully with the ſand, and until ſhe is retired from them to a convenient diſtance. Then, all together, encouraging each other with cries, they pour down upon the neſt, hook up the ſand in a moment, lay the eggs bare, and devour the whole brood without remorſe. Wretched as is the fleſh of theſe animals, yet men, perhaps, when preſſed by hunger, have been tempted to taſte it. Nothing can be more lean, ſtringy, nauſeous, and unſavory. It is in vain that, when killed, the rump has been cut off; in vain the body has been waſhed, and ſpices uſed to overpower its prevailing odour; it ſtill ſmells and taſtes of the carrion by which it was nouriſhed, and ſends forth a ſtench that is inſupportable. Theſe birds, at leaſt thoſe of Europe, uſually lay two eggs at a time, and produce but once a year. They make their neſts in inacceſſible cliffs, and in places ſo remote that it is rare to find them.

The moſt remarkable ſpecies of the vulture are as follow:

The *Alpine Vulture*, or percnopter. The male of which Linnæus ſays is wholly white; the quills black with hoary edges, except the two outer ones, which are entirely black. The female is quite brown, except the four outer quills, which are black. In ſize it exceeds the common eagle. They fly in troops, and are very uſeful in deſtroying mice.

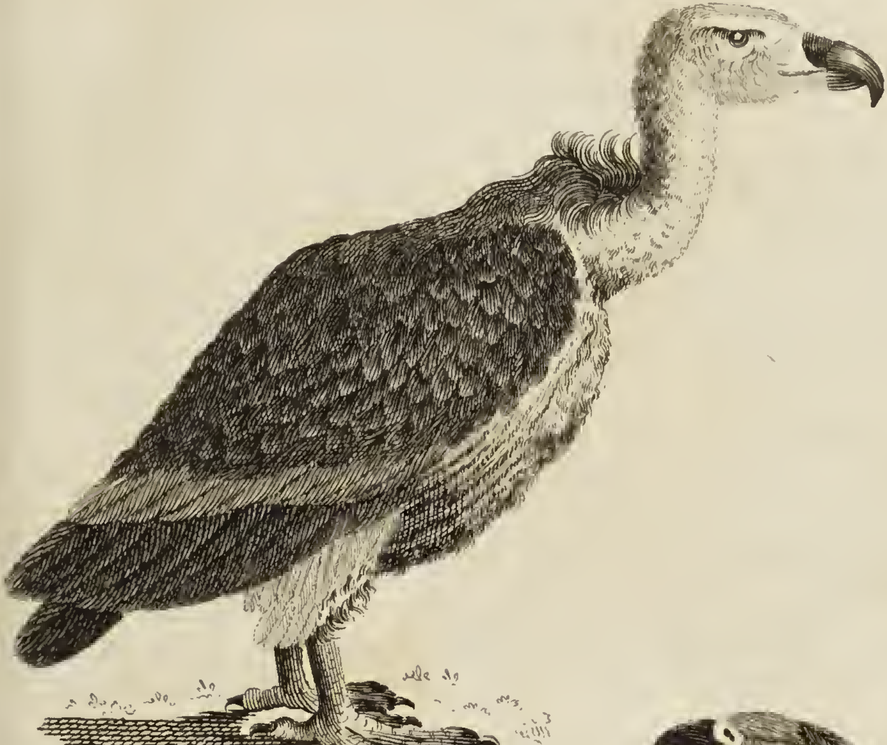
The *Fulvous Vulture*, or *Griffon*. It is about three feet ſix inches in length, and eight feet in the wings. The head, neck, and ruff are white; the back reddiſh grey; the quills and tail black; the breaſt bare of feathers, and covered with downy hair. This is probably a variety of the golden vulture.

The *Golden Vulture* is larger than the golden eagle, being four feet eight inches long. The body is black above, and reddiſh beneath; the quills and tail brown.

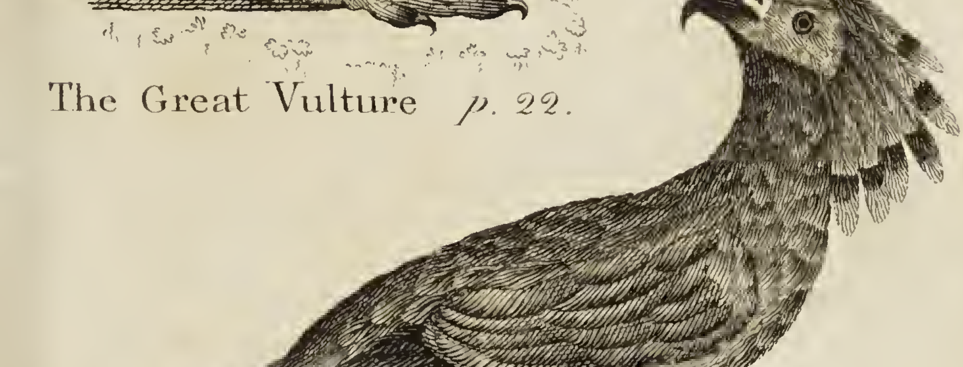
The *cinereous*, or *great vulture* (See pl. XLIII.) is rather leſs than the laſt ſpecies, but larger than the common eagle. The head and neck are covered with brown down, and beneath the throat there is a kind of beard. The body is brown, and the legs are feathered down to the toes. It inhabits Europe.

The *bare vulture* is ſmaller than all the preceding. It is of a ſhining reddiſh black; the breaſt inclining to yellow.

Plate 43.



The Great Vulture *p.* 22.



The Secretary *p* 23.

It is found in many parts of Europe and Aſia. When it is ſitting or ſtanding, it erects a creſt on its head, which does not appear when it flies.

The *aſh-coloured*, or *ſmall vulture*, is the ſize of a large cock. It is generally of a ſooty grey, ſpotted with cheſnut, and the head and neck white. One which was received from Norway had the head and neck bare, and of a reddiſh colour, and the body almoſt entirely white, except the quills, which were black.

Of thoſe birds which may be accounted foreign, that which is called the *king vulture* (See pl. LXV.) greatly demands pre-eminence. It is the ſize of a hen turkey. The head and neck are entirely bare of feathers, but a fillet of blackiſh down encompaſſes the head. At the bottom of the neck, juſt above the ſhoulders, there is a ruff of aſh-coloured feathers. The body is a reddiſh brown, the belly white, with a tinge of yellow, and the quills are black. It is a native of South America and the Weſt Indies.

The *carrion vulture*, or *turkey buzzard*, is the next in order and conſequence. They are found in vaſt flocks in all parts of America, where they are of great utility in deſtroying ſnakes and vermin, and devouring the dead and putrid carcaſſes. This bird is about the ſize of a turkey. The head and neck are bare of feathers, and of a reddiſh colour, and the ſides of the head warted like thoſe of a turkey. The whole plumage is a browniſh black, with a purple and greeniſh gloſs in different directions.

The *Egyptian vulture* is much of the ſame nature, but is not above the ſize of a kite.

But of all the birds of this genus, the *Secretary* (See pl. XLIII.) is the moſt elegant. It is full three feet in height; the bill black, and like that of an eagle. On the upper eye-lid there are large briſtles, like eye-laſhes, and from the back of the head ſprings a beautiful pendant creſt. The body in general is aſh-coloured, and the tips of the wings are black. It inhabits all the ſouthern parts of Africa.

Beſides theſe, naturaliſts have mentioned the *creſted vulture*, the *Arabian vulture*, the *bearded vulture*, the *black vulture*, the *Angola*, and the *Bengal vultures*, the *tawny vulture*, &c.

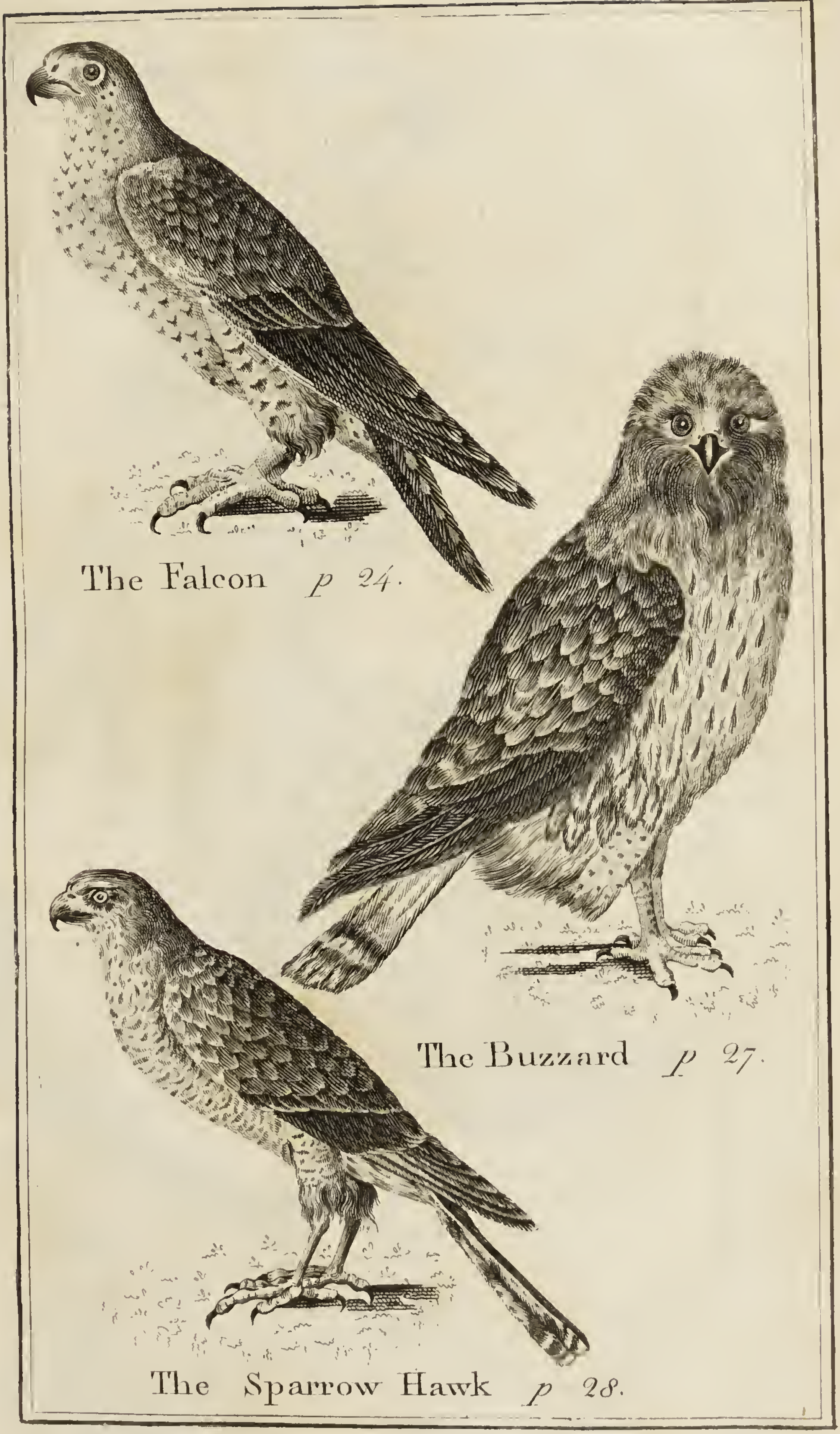
THE FALCON.] Falconry, which is now ſo much diſuſed among us, was the principal amuſement of our anceſtors. A perſon of rank ſcarcely ſtirred out without his hawk on his hand, which in old paintings is the criterion of nobility. The expence which attended this ſport was very great: among the old Welch princes, the king's falconer was the fourth officer in the ſtate; but, notwithſtanding all his honours, he was forbiden to take more than three draughts of beer from his horn, leſt he ſhould get drunk and neglect his duty. In the reign of James the Firſt, Sir Thomas Monſon is ſaid to have given a thouſand pounds for a caſt of hawks; and ſuch was their value in general, that it was made felony in the reign of Edward the Third to ſteal a hawk. To take its eggs, even in a perſon's own ground, was puniſhable with impriſonment for a year and a day, together with a fine at the king's pleaſure.

Of many of the ancient falcons uſed for this purpoſe, we at this time know only the names. Of thoſe in uſe at preſent, both here and in other countries, are the gyr-falcon, the falcon, the lanner, the ſacre, the hobby, the keſtril, and the merlin. Theſe are called the long-winged hawks, to diſtinguiſh them from the goſs-hawk, the ſparrow-hawk, the kite, and the buzzard, that are of ſhorter wing, and either too ſlow, too cowardly, too indolent, or too obſtinate, to be ſerviceable in contributing to the pleaſures of the field.

The *gyr-falcon* leads in this bold train. In ſize he exceeds all other falcons, for he approaches nearly to the magnitude of the eagle. The top of the head is flat, and of an aſh colour, with a ſtrong, thick, ſhort, and blue beak. The feathers of the back and wings are marked with black ſpots, in the ſhape of an heart; he is a courageous and fierce bird, nor fears even the eagle himſelf; but he chiefly flies at the ſtork, the heron, and the crane. He is moſtly found in the colder regions of the north, but loſes neither his ſtrength nor his courage when brought into the milder climates.

The *falcon*, properly ſo called, (See pl. XLIV.) is the ſecond in magnitude and fame. There are ſome varieties in this bird; but there ſeem to be only two that claim diſtinction; the *falcon-gentil*, and the *peregrine-falcon*; both are much leſs than the gyr, and ſomewhat about the ſize of a raven. Next in ſize to theſe is the *lanner* (See pl. XLV.) a bird now very little known in Europe; then follows the *ſacre*, the legs of which are of a bluiſh colour, and ſerve to diſtinguiſh that bird; to them ſucceeds the

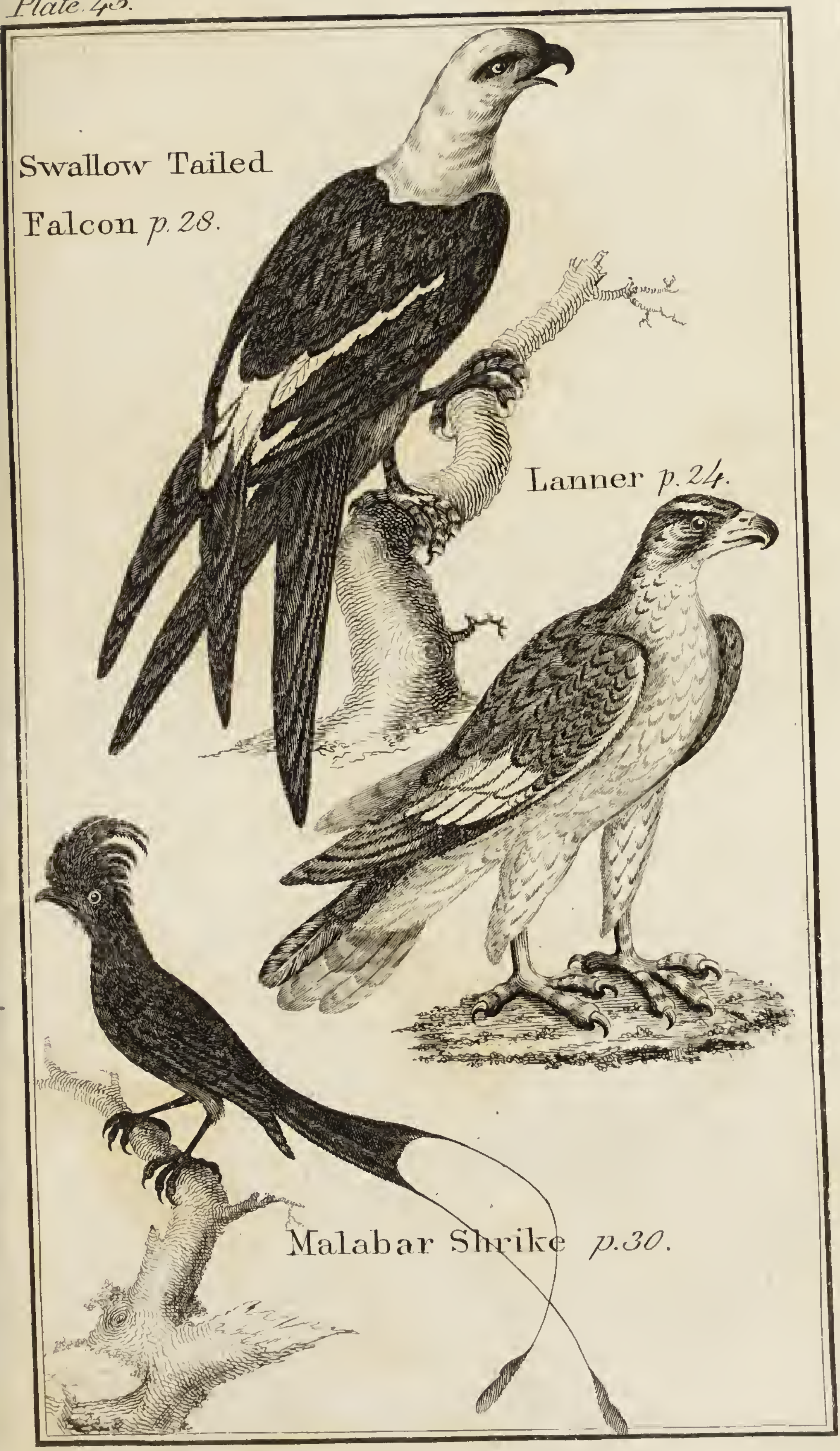
Plate 44.



The Falcon *p* 24.

The Buzzard *p* 27.

The Sparrow Hawk *p* 28.


Swallow Tailed
Falcon p. 28.
Lanner p. 24.
Malabar Shrike p. 30.

hobby, uſed for ſmaller game, for daring larks, and ſtooping at quails. The *keſtril* was trained for the ſame purpoſes; and laſtly the *merlin*; which, though the ſmalleſt of all the hawk or falcon kind, and not much larger than a thruſh, yet diſplays a degree of courage that renders him formidable even to birds ten times his ſize. He has often been known to kill a partridge or a quail at a ſingle pounce from above.

The courage of theſe creatures in general was ſuch, that no bird, not very much above their own ſize, could terrify them; their ſwiftneſs ſo great, that ſcarce any bird could eſcape them; and their docility ſo remarkable, that they obeyed not only the commands, but the ſigns of their maſter. They remained quietly perched upon his hand till their game was fluſhed, or elſe kept hovering round his head, without ever leaving him but when he gave permiſſion. The common falcon is a bird of ſuch ſpirit, that, like a conqueror in a country, he keeps all birds in awe and in ſubjection to his proweſs. Where he is ſeen flying wild, the birds of every kind, that ſeemed entirely to diſregard the kite or the ſparrow-hawk, fly with ſcreams at his moſt diſtant appearance.

In order to train up a falcon, the maſter begins by clapping ſtraps upon his legs, which are called jeſſes, to which there is faſtened a ring with the owner's name, by which, in caſe he ſhould be loſt, the finder may know where to bring him back. To theſe alſo are added little bells, which ſerve to mark the place where he is, if loſt in the chace. He is always carried on the hand, and is obliged to be kept without ſleeping. If he be ſtubborn, and attempts to bite, his head is plunged into water. Thus, by hunger, watching, and fatigue, he is conſtrained to ſubmit to having his head covered by a hood or cowl, which covers his eyes. This troubleſome employment continues often for three days and nights without ceaſing. It rarely happens but at the end of this his neceſſities, and the privation of light make him loſe all idea of liberty, and bring down his natural wildneſs. His maſter judges of his being tamed when he permits his head to be covered without reſiſtance, and when uncovered he ſeizes the meat before him contentedly. The repetition of theſe leſſons by degrees enſures ſucceſs. His wants being the chief principle of his dependance, it is endeavoured to increaſe his appetite by giving him little balls of flannel, which he greedily ſwallows. Having thus excited the appetite, care is taken to ſatisfy it; and thus gratitude attaches the bird to the man who but juſt before had been his tormentor.

When the firſt leſſons have ſucceeded, and the bird ſhews ſigns of docility, he is carried out upon ſome green, the head is uncovered, and, by flattering him with food at different times, he is taught to jump on the hand, and to continue there. When confirmed in this habit, it is then thought time to make him acquainted with the lure. This lure is only a thing ſtuffed like the bird the falcon is deſigned to purſue, ſuch as an heron, a pigeon, or a quail, and on this lure they always take care to give him his food. It is quite neceſſary that the bird ſhould not only be acquainted with this, but fond of it, and delicate in his food when ſhewn it. The uſe of this lure is to flatter him back when he has flown in the air, which he ſometimes fails to do; and it is always requiſite to aſſiſt it by the voice and the ſigns of the maſter. When the familiarity and the docility of the bird are ſufficiently confirmed on the green, he is then carried into the open fields, but ſtill kept faſt by a ſtring which is about twenty yards long. He is then uncovered as before; and the falconer, calling him at ſome paces diſtance, ſhews him the lure. When he flies upon it he is permitted to take a large morſel of the food which is tied to it. The next day the lure is ſhewn him at a greater diſtance, till he comes at laſt to fly to it at the utmoſt length of his ſtring. He is then to be ſhewn the game itſelf alive, but diſabled or tame, which he is deſigned to purſue. After having ſeized this ſeveral times with his ſtring, he is then left entirely at liberty, and carried into the field for the purpoſes of purſuing that which is wild. At that he flies with avidity; and when he has ſeized it, or killed it, he is brought back by the voice and the lure.

By this method of inſtruction, an hawk may be taught to fly at any game whatſoever; but falconers have chiefly confined their purſuit only to ſuch animals as yield them profit by the capture, or pleaſure in the purſuit. The hare, the partridge, and the quail, repay the trouble of taking them; but the moſt delightful ſport is the falcon's purſuit of the heron, the kite, or the wood-lark. Inſtead of flying directly forward, as ſome other birds do, theſe, when they ſee themſelves threatened by the approach of the hawk, immediately take to the ſkies. They fly almoſt perpendicularly upward, while their ardent purſuer keeps pace with their flight, and tries to riſe above them. Thus both diminiſh by degrees from the gazing ſpectator below, till they are quite loſt in the clouds; but they are ſoon ſeen deſcending, ſtruggling together, and uſing every effort on both ſides; the one of rapacious inſult, the other of deſperate defence. The unequal combat is ſoon at an end: the falcon comes off victorious, and the other, killed or diſabled, is made a prey either to the bird or the ſportſman.

As for other birds, they are not ſo much purſued, as they generally fly ſtraight forward, by which the ſportſman loſes ſight of the chace, and what is ſtill worſe, runs a chance of loſing his falcon alſo. The purſuit of the lark by a couple of merlins is conſidered, by him only who regards the ſagacity of the chace, as one of the moſt delightful ſpectacles this exerciſe can afford. The amuſement is, to ſee one of the merlins climbing to get the aſcendant of the lark, while the other, lying low for the beſt advantage, waits the ſucceſs of its companion's efforts; thus, while the one ſtoops to ſtrike its prey, the other ſeizes it at its coming down.

The more ignoble race of birds make up by cunning and aſſiduity what theſe claim by force and celerity. The *kite*, which may be diſtinguiſhed from all the reſt of this tribe by his forky tail, and his ſlow floating motion, ſeems almoſt for ever upon the wing. He lives only upon accidental carnage, as almoſt every bird in the air is able to make good his retreat againſt him. He may be therefore conſidered as an inſidious thief, who only prowls about, and, when he finds a ſmall bird wounded, or a young chicken ſtrayed too far from the mother, inſtantly ſeizes the hour of calamity, and, like a famiſhed glutton, is ſure to ſhew no mercy. His hunger, indeed, often urges him to acts of ſeeming deſperation. We have ſeen one of them fly round and round for a while to mark a clutch of chickens, and then on a ſudden dart like lightning upon the unreſiſting little animal, and carry it off, the hen in vain crying out, and the boys hooting and caſting ſtones to ſcare it from its plunder. For this reaſon, of all birds the kite is the good houſewife's greateſt tormentor and averſion.

Of all obſcene birds, the kite is the beſt known; but the *buzzard* (See pl. XLIV.) among us is the moſt common. This bird is in length one foot eight inches. The back and wings are brown; the belly is yellowiſh, ſpotted with brown, and the tail is a light brown tanned with black. The buzzard is a ſluggiſh, inactive bird, and often remains perched whole days together upon the ſame bough. He is rather an aſſaſſin than a purſuer; and lives more upon frogs, mice, and inſects, which he can eaſily ſeize, than upon birds which he is obliged to follow. He lives in ſummer by robbing the neſts of other birds, and ſucking their eggs, and more reſembles the owl kind in his countenance than any other rapacious bird of day. The *goſs-hawk* and *ſparrow-hawk* (See pl. XLIV.) are what Mr. Willoughby calls ſhort-winged birds, and are conſequently unfit for training, however injurious they may be to the pigeon-houſe or the ſportſman. They have been indeed taught to fly at game; but little is to be obtained from their efforts, being difficult of inſtruction, and capricious in their obedience.

Of the buzzard, kite, and falcon kind, above ſeventy different ſpecies, foreign and domeſtic, have been enumerated. Of all theſe the nature and properties are nearly the ſame, and the deſcription which we have given of the gyrfalcon will apply to moſt of the hawk ſpecies, only differing in ſize and other minuter particulars; and that of the buzzard to the kites in general, with the ſame allowance. Of the foreign birds of theſe ſpecies, ſome are creſted, and others have plumage differing from ours. In plate XLV, is repreſented the *ſwallow-tailed falcon* of America. Of this beautiful bird the head, neck, and breaſt are white, the back and wings are black, gloſſed with purple and green. The tail is forked like that of a ſwallow, and like that bird it ſubſiſts almoſt entirely on the wing. It is rather ſmaller than the common kite.

THE SHRIKE, OR BUTCHER BIRD.] Before we conclude this ſhort hiſtory of rapacious birds that prey by day, it may not be improper to deſcribe a tribe of ſmaller birds, that ſeem from their ſize rather to be claſſed with the harmleſs order of the ſparrow-kind; but that from their crooked beak, courage, and appetite for ſlaughter, certainly deſerve a place here. The leſſer butcher-bird is not much above the ſize of a lark; that of the ſmalleſt ſpecies is not ſo big as a ſparrow; yet, diminutive as theſe little animals are, they make themſelves formidable to birds of four times their dimenſions.

The *great cinereous ſhrike*, or *butcher-bird*, (See pl. XLVI.) is ſometimes nearly a foot in length; its bill is black, an inch long, and hooked at the end; at the ſame time its legs and feet are ſlender, and its toes are formed rather like thoſe of ſuch as live chiefly upon inſects and grain. Its plumage on the back is pale aſh-colour, the belly is white, and a black ſtripe runs from the beak parallel with its eyes. Its habits ſeem to correſpond with its conformation, and it lives as well upon fleſh as upon inſects, and thus partakes in ſome meaſure of a double nature. Its appetite for fleſh, however, is the moſt prevalent; and it never takes up with the former when it can obtain the latter. This bird, therefore, leads a life of continual combat and oppoſition. As from its ſize it does not much terrify the ſmaller birds of the foreſt, ſo it very frequently meets birds willing to try its ſtrength, and it never declines the engagement. In Ruſſia it is trained for catching ſmall birds, like a falcon.

It is wonderful to ſee with what intrepidity this little creature goes to war with the pie, the crow, and the keſtril, all above four times larger than itſelf. It not only fights upon the defenſive, but often comes to the attack, and always with advantage, particularly when the male and female unite to protect their young, and to drive away the more powerful birds of rapine. At that ſeaſon, they do not wait the approach of their invader; it is ſufficient that they ſee him preparing for the aſſault at a diſtance. It is then that they ſally forth with loud cries, wound him on every ſide, and drive him off with ſuch fury, that he ſeldom ventures to return to the charge. In theſe diſputes, they generally come off with victory; though it ſometimes happens that they fall to the ground with the bird they have ſo fiercely fixed upon, and the combat ends with the deſtruction of the aſſailant as well as of the defender.

For this reaſon, the moſt redoubtable birds of prey reſpect them; while the kite, the buzzard, and the crow, ſeem rather to fear than ſeek the engagement. Nothing in nature better diſplays the reſpect paid to the claims of courage, than to ſee this little bird, apparently ſo contemptible, fly in company with the lanner, the falcon, and all the tyrants of the air, without fearing their power, or avoiding their reſentment.

As for ſmall birds, they are its uſual food. It ſeizes them by the throat, and ſtrangles them in an inſtant. When it has thus killed the bird or inſect, it is aſſerted that it fixes them upon ſome neighbouring thorn, and, when thus ſpitted, pulls them to pieces with its bill. It is ſuppoſed that as nature has not given this bird ſtrength ſufficient to tear its prey to pieces with its feet, as the hawks do, it is obliged to have recourſe to this extraordinary expedient.

During ſummer, ſuch of them as conſtantly reſide here, for the ſmaller red butcher-bird migrates, remain among the mountainous parts of the country; but in winter they deſcend into the plains and nearer human habitations. The larger kind make their neſts on the higheſt trees, while the leſſer build in buſhes in the fields and hedge-rows. They both lay about ſix eggs, of a white colour, but encircled at the larger end with a ring of browniſh red. The neſt on the outſide is compoſed of white moſs, interwoven with long graſs; within, it is well lined with wool, and it is uſually fixed among the forking branches of a tree. The female feeds her young with caterpillars and other inſects while very young; but ſoon after accuſtoms them to fleſh, which the male procures with ſurpriſing induſtry. Their nature alſo is very different from other birds of prey in their parental care; for, ſo far from driving out their young from the neſt to ſhift for themſelves, they keep them with care; and even when adult they do not forſake them, but the whole brood live in one family together. Each family lives apart, and is generally compoſed of the male, female, and five or ſix young ones; theſe all maintain peace and ſubordination among each other, and hunt in concert. It is eaſy to diſtinguiſh theſe birds at a diſtance, not only from their going in companies, but alſo from their manner of flying, which is always up and down, ſeldom direct or ſide-ways.

Of theſe birds there are above forty different kinds, foreign and domeſtic; but the great *cinereous butcher-bird* is the leaſt known among us. The *red-backed*, which is in length ſeven inches and a half, and which is of a reddiſh brown, with a black tail, migrates in autumn, and does not return till ſpring. The *woodchat* reſembles the former, except in the colour of the back, which is brown, and not red, as in the other.

The foreign birds of the ſhrike genus are infinitely varied in plumage, &c. Of theſe we have only engraved one in plate XLV. as conſpicuous for the ſingularity and beauty of its form, viz. the *Malabar ſhrike.* It is the ſize of the miſſel thruſh. The general colour of its plumage is black, though on the back it is gloſſed with a fine ſhade of blue. Its head is creſted, and the two outer feathers of the tail are three times the length of the others, and have for about ſix inches the ſhaft quite naked.

THE OWL.] All birds of the owl kind have one common mark, by which they are diſtinguiſhed from others; their eyes, like thoſe of tigers and cats, are formed for ſeeing better in the duſk, than in the broad glare of ſun-ſhine. The pupil, in fact, is capable of opening very wide, or ſhutting very cloſe: and, by contracting it, the brighter light of the day, which would act too powerfully upon the ſenſibility of the eye, is excluded; while, by dilating the pupil, the animal takes in the more faint rays of the night, and thereby is enabled to ſpy its prey, and catch it with greater facility in the dark.

But though owls are dazzled by too bright a day-light, yet they do not ſee beſt in the darkeſt nights, as ſome have been apt to imagine.

The nights when the moon ſhines are the times of their moſt ſucceſsful plunder; for when it is wholly dark, they are leſs qualified for ſeeing and purſuing their prey: except, therefore, by moonlight, they contract the hours of their chace; and if they come out at the approach of duſk in the evening, they return before it is totally dark, and then riſe by twilight the next morning, to purſue their game, and to return, in like manner, before the broad day-light begins to dazzle them with its ſplendour.

Yet the faculty of ſeeing in the night, or of being entirely dazzled by day, is not alike in every ſpecies of theſe nocturnal birds. The common white or barn owl, for inſtance, ſees with ſuch exquiſite acuteneſs in the dark, that though the barn has been ſhut at night, and the light thus totally excluded, yet it perceives the ſmalleſt mouſe that peeps from its hole: on the contrary, the brown horned owl is often ſeen to prowl along the hedges by day, like the ſparrow-hawk; and ſometimes with good ſucceſs.

All birds of the owl kind may be divided into two ſorts; thoſe that have horns, and thoſe without. Theſe horns are nothing more than two or three feathers that ſtand up on each ſide of the head over the ear, and give this animal a kind kihd of horned appearance. Of the horned kind, is the *great eared*, or *horned owl*, which at firſt view appears as large as an eagle, though when he comes to be obſerved more cloſely, he will be found much leſs. His eyes are large and tranſparent, encircled with an orange-coloured iris: his ears are large and deep: his plumage is of a reddiſh brown, marked on the back, with black and yellow ſpots, and yellow only upon the belly. This bird has been ſeen in Scotland, and in Yorkſhire, but is not common in England.

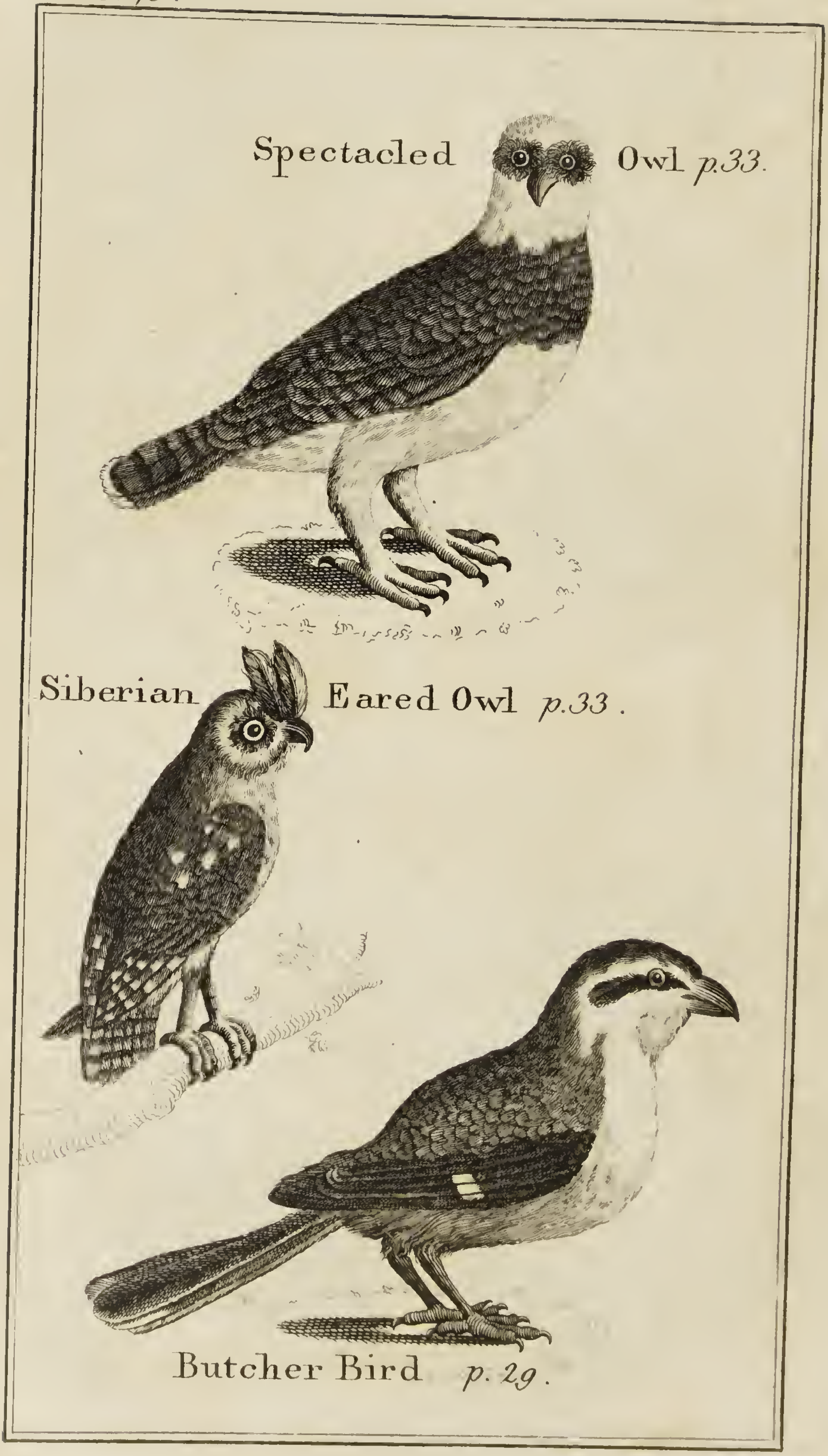
Next to this we may claſs that which is called the *long-eared owl*. It is in length fourteen inches and a half. The eared tufts conſiſt of ſix feathers. It is a reddiſh brown on the back, with a mixture of white; and the belly is white, ſpotted with brown. The legs are feathered down to the toes. Theſe birds are ſeldom at the trouble of making a neſt for themſelves, but generally take poſſeſſion of an old magpie's or buzzard's neſt. They lay four or five eggs. The young are white at firſt, but come to their colour in fifteen days. They are common in France and England.

The *ſhort-eared owl* is only fourteen inches long. It has one feather half an inch longer than the reſt on each ſide of the head, which it can erect at pleaſure. Its back is brown, and the belly a pale yellow, ſtreaked with brown. The legs are feathered to the toes. It may be accounted a bird of paſſage, viſiting us in October, and retiring in ſpring.

The *ſcops* is ſtill ſmaller than the laſt mentioned bird, which it reſembles in moſt reſpects. It is, however, only ſeven or eight inches long, that is not ſo large as a thruſh; its ears conſiſt of two feathets, which are juſt elevated above the others. In France it appears as a bird of paſſage; but it is dubious whether it ever viſits England.

To theſe ſucceeds the tribe without horns. The *howlet*, or *aluco*, which is the largeſt of this kind, with duſky plumes, and black eyes; the *ſcreech*, or *tawny owl*, of a ſmaller ſize, that is, about fourteen inches, with blue eyes, and plumage of an iron-grey; the *white owl*, about as large as the former, with yellow eyes, and whitiſh plumage; the *brown owl*, leſs than the former, with brown plumage, and a brown beak; and, laſtly, the *little brown owl*, with yellowiſh-coloured eyes, and an orange-coloured bill.

Plate. 46.



Spectacled Owl *p.33.*

Siberian Eared Owl *p.33.*

Butcher Bird *p. 29.*

Of thoſe owls which may in France and England be termed foreign, near thirty different ſpecies have been enumerated. Of theſe we have ſelected only two. The firſt is the *Siberian eared owl*, (See pl. XLVI.) which is a moſt beautiful little bird, about the ſize of a houſe ſparrow, that is, ſcarcely ſix inches in length. The bill is brown, the eared feathers one inch in height. The whole body is aſh-coloured, and delicately powdered, and variegated with brown and white ſpots.

The other owl, which is preſented to the reader in plate XLVI, is called the *ſpectacled owl.* It is about three times as large as the preceding. The feathers on the head and neck are white and woolly; but on each ſide of the head there is a large patch of black brown, which ſurrounds the eyes. The upper parts of the body are reddiſh brown, with a bar of the ſame kind croſſing the breaſt; the under parts of the body are white.

All this tribe of animals, however they may differ in their ſize and plumage, agree in their general characteriſtics of preying by night; their bodies are ſtrong and muſcular; their feet and claws made for tearing their prey; and their ſtomachs for digeſting it. It muſt be remarked, however, that the digeſtion of all birds that live upon mice, lizards, or ſuch like food, is not very perfect; for though they ſwallow them whole, yet they are always ſeen ſome time after to diſgorge the ſkin and bones, rolled up in a pellet, as being indigeſtible.

As they are incapable of ſupporting the light of the day, or at leaſt of then ſeeing and readily avoiding their danger, they keep all this time concealed in ſome obſcure retreat, ſuited to their gloomy appetites, and there continue in ſolitude and ſilence. The cavern of a rock, the darkeſt part of an hollow tree, the battlements of a ruined unfrequented caſtle, ſome obſcure hole in a farmer's out-houſe, are the places where they are uſually found: if they be ſeen out of theſe retreats in the day-time, they may be conſidered as having loſt their way; as having by ſome accident been thrown into the midſt of their enemies, and ſurrounded with danger.

In this diſtreſs they are obliged to take ſhelter in the firſt tree or hedge that offers, there to continue concealed all day, till the returning darkneſs once more ſupplies them with a better plan of the country. But it too often happens, that, with all their precaution to conceal themſelves, they are ſpied out by the other birds of the place, and are ſure to receive no mercy. The blackbird, the thruſh, the jay, the bunting, and the redbreaſt, all come in file, and employ their little arts of inſult and abuſe. The ſmalleſt, the feebleſt, and the moſt contemptible of this unfortunate bird's enemies, are then the foremoſt to injure and torment him. They encreaſe their cries and turbulence round him, flap him with their wings, and are ready to ſhew their courage to be great, as they are ſenſible that their danger is but ſmall. The unfortunate owl, not knowing where to attack, or whither to fly, patiently ſits and ſuffers all their inſults. Aſtoniſhed and dizzy, he only replies to their mockeries by awkward and ridiculous geſtures, by turning his head, and rolling his eyes with an air of ſtupidity. It is enough that an owl appears by day to ſet the whole grove into a kind of uproar. Either the averſion all the ſmall birds have to this animal, or the conſciouſneſs of their own ſecurity, makes them purſue him without ceaſing, while they encourage each other by their mutual cries to lend aſſiſtance in this laudable undertaking.

It ſometimes happens, however, that the little birds purſue their inſults with the ſame imprudent zeal with which the owl himſelf had purſued his depredations. They hunt him the whole day until evening returns; which reſtoring him his faculties of ſight once more, he makes the foremoſt of his purſuers pay dear for their former ſport: nor is man always an unconcerned ſpectator here. The bird-catchers have got an art of counterfeiting the cry of the owl exactly; and, having before limed the branches of an hedge, they ſit unſeen and give the call. At this, all the little birds flock to the place where they expect to find their well-known enemy; but, inſtead of finding their ſtupid antagoniſt, they are ſtuck faſt to the hedge themſelves. This ſport muſt be put in practice an hour before night-fall, in order to be ſucceſsful; for if it is put off till later, thoſe birds which but a few minutes ſooner came to provoke their enemy, will then fly from him with as much terror as they juſt before ſhewed inſolence.

It is not unpleaſant to ſee one ſtupid bird made in ſome ſort a decoy to deceive another. The great horned owl is ſometimes made uſe of for this purpoſe, to lure the kite, when falconers deſire to catch him for the purpoſes of training the falcon. Upon this occaſion, they clap the tail of a fox to the great owl, to render his figure extraordinary; in which trim he ſails ſlowly along, flying low, which is his uſual manner. The kite, either curious to obſerve this odd kind of animal, or perhaps inquiſitive to ſee whether it may not be proper for food, flies after, and comes nearer and nearer. In this manner he continues to hover, and ſometimes to deſcend, till the falconer, ſetting a ſtrong winged hawk againſt him, ſeizes him for the purpoſe of training his young ones at home.

The uſual place where the great horned owl breeds is in the cavern of a rock, the hollow of a tree, or the turret of ſome ruined caſtle. Its neſt is near three feet in diameter, and compoſed of ſticks, bound together by the fibrous roots of trees, and lined with leaves on the inſide. It lays about three eggs, which are larger than thoſe of a hen, and of a colour ſomewhat reſembling the bird itſelf. The leſſer owl of this kind never makes a neſt for itſelf, but always takes up with the old neſt of ſome other bird, which it has often been forced to abandon. It lays four or five eggs; and the young are all white at firſt, but change colour in about a fortnight. The other owls in general build near the place where they chiefly prey; that which feeds upon birds in ſome neighbouring grove, that which preys chiefly upon mice near ſome farmer's yard, where the proprietor of the place takes care to give it perfect ſecurity. In fact, whatever miſchief one ſpecies of owl may do in the woods, the barn-owl makes a ſufficient recompenſe for, by being equally active in deſtroying mice nearer home; ſo that a ſingle owl is ſaid to be more ſerviceable than half a dozen cats in ridding the barn of its domeſtic vermin. "In the year 1580," ſays an old writer, "at Hallontide, an army of mice ſo over-run the "marſhes near Southminſter, that they eat up the graſs to "the very roots. But at length a great number of ſtrange "painted owls came and devoured all the mice. The like "happened again in Eſſex about ſixty years after."

CHAP. II.

Of Birds of the Gallinaceous, or Poultry Order—The BUSTARD*—The little Buſtard—Foreign Birds—The Hoobara, and the Rhaad—The* COCK*—The* TURKEY*—The horned Turkey—The Guan, Yacou, and Marail Turkies—The* PINTADO*—The* GROUS*—The Cock of the Wood—The Black and Red Grous—The Hazel Grous—The Pintailed Grous—The Ptarmigan—The Ruffed Grous—The* PEACOCK*—The* PHEASANT*—The Golden, Argus, Superb, and Impeygan Pheaſant—The* CURASSOW*—Cuſhewbird—The* PARTRIDGE*—The Francolin—The Quail—Creſted Quail, &c.—The Columbine Order—The Tame* PIGEON*—The Ring Dove—The Crowned Pigeon—The Turtle Dove.*

The Gallinaceous (or Poultry) Order.

IT is obvious that this order of birds is the very oppoſite of that which we have ſo lately been deſcribing. They are without talons, without the hooked bills of the rapacious kind; but there is another particular of ſtill more importance in which they materially differ. In the rapacious order which feed upon fleſh, the digeſtion is carried on by means of a liquid in the ſtomach, which diſſolves the food. In this which feeds chiefly upon grain, the gizzard is the principal inſtrument which grinds and reduces the grain to a pulp. This fact is deciſively proved by an eaſy experiment. If a grain of corn be incloſed in a tube or a globe of metal which is ſtrong enough to reſiſt the action of the gizzard, it will paſs through the body of the fowl, the grain a little ſwelled, but completely unaltered for any of the purpoſes of digeſtion or nouriſhment.

THE BUSTARD (See pl. XLVII.) is the largeſt land-bird that is a native of Europe. It was once much more numerous than it is at preſent; but the encreaſed cultivation of the country, and the extreme delicacy of its fleſh, has greatly thinned the ſpecies; ſo that a time may come when it may be doubted whether ever ſo large a bird was bred among us. It is probable that long before this the buſtard would have been ex-

extirpated, but for its peculiar manner of feeding. It inhabits only the open and extenſive plain, where its food lies in abundance, and where every invader may be ſeen at a diſtance.

The weight of this bird varies conſiderably, ſome have been found of not more than ten pounds, others there have been of twenty-ſeven, and even thirty. The buſtard is diſtinguiſhed from the oſtrich, the touyou, the caſſowary, and the dodo, by its wings, which, although diſproportioned to the ſize of its body, yet ſerve to elevate it into the air, and enable it to fly, though with ſome difficulty; they are generally about four feet from the tip of one to the other. The neck is a foot long, and the legs a foot and a half. The head and neck of the male are aſh-coloured; the back is barred tranſverſely with black, bright, and ruſt-colour. The greater quill-feathers are black; the belly white; and the tail, which conſiſts of twenty feathers, is marked with broad black bars.

The buſtard (according to Plutarch) is found in Lybia, in the environs of Alexandria, in Syria, in Greece, in Spain, in France, in the plains of Poitou and Champagne; they are frequently ſeen in flocks of fifty or more, in the extenſive downs of Saliſbury Plain, in the heaths of Suſſex and Cambridgeſhire, the Dorſetſhire uplands, and as far as Eaſt Lothian, in Scotland. In thoſe extenſive plains, where there are no woods to ſcreen the ſportſman, nor hedges to creep along, the buſtards enjoy an indolent ſecurity. Their food is compoſed of the berries that grow among the heath, and the large earth-worms that appear in great quantities on the downs before ſun-riſing in ſummer. It is in vain that the fowler creeps forward to approach them, they have always centinels placed at proper eminences, which are ever on the watch, and warn the flock of the ſmalleſt appearance of danger. All therefore that is left the ſportſman, is the comfortleſs view of their diſtant ſecurity. He may wiſh, but they are in ſafety.

It ſometimes happens that theſe birds, though they are ſeldom ſhot by the gun, are run down by grey-hounds. As they are voracious and greedy, they often ſacrifice their ſafety to their appetite, and feed themſelves ſo very fat, that they are unable to fly without great preparation. When the greyhound, therefore, comes within a certain diſtance, the buſtard runs off flapping its wings, and endeavouring to gather air enough under them to riſe; in the mean time, the enemy approaches nearer and nearer, till it is too late for the bird even to think of obtaining ſafety by flight; for juſt at the riſe there is always time loſt, and of this the bird is ſenſible; it continues, therefore, on the foot until it has got a ſufficient way before the dog for flight, or until it is taken.

If we may credit Ælian, there is no contrivance ſo ſimple as not to be fit for the capture of this bird, ſince that author relates, that, in the kingdom of Pontus, the foxes make uſe of a curious ſtratagem in order to take them. The fox elevates his buſhy tail, which he cauſes to imitate as much as poſſible the motions of the bird's neck; the buſtards, he adds, which miſtake it for a bird of their ſpecies, approach it without apprehenſion, and become the prey of that crafty animal. All this, however, ſuppoſes infinite cunning in the fox, infinite ſtupidity in the bird, and perhaps infinite credulity in the writer.

As there are few places where they can at once find proper food and ſecurity, ſo they generally continue near their old haunts, ſeldom wandering above twenty or thirty miles from home. As their food is replete with moiſture, it enables them to live upon theſe dry plains, where there are ſcarcely any ſprings of water, a long time without drinking. Beſides this, Nature has given the males an admirable magazine for their ſecurity againſt thirſt. This is a pouch, the entrance of which lies immediately under the tongue, and capable of holding near ſeven quarts of water. This is probably filled upon proper occaſions, to ſupply the hen when ſitting, or the young before they can fly.

They make no neſt, but only ſcrape a hole in the earth, and ſometimes line it with a little long graſs or ſtraw. There they lay two eggs only, almoſt of the ſize of a gooſe-egg, of a pale olive-brown, marked with ſpots of a darker colour. They hatch for about thirty days, and the young ones run about as ſoon as they are out of the ſhell.

It is ſaid that when the perſecuted mother is apprehenſive of the hunters, and is diſturbed from her neſt, ſhe takes her eggs under her wings, and tranſports them to a place of ſafety. The fact is, however, that following the inſtinct of all the birds of this kind, they generally make their neſt in the corn, where they are almoſt certain of remaining undiſturbed.

The buſtard is not known in America—Beſides the delicacy of their fleſh, the quills are valuable, as they make excellent pens, but they are ſtill more eſteemed by anglers who uſe them as floats; for, as they are ſpotted with black, the notion is, that theſe black ſpots appear as flies to the fiſh, which they rather allure than drive away by this appearance.

The *little buſtard* differs only from the preceding in being of a ſmaller ſize, being not larger than a pheaſant, or about ſeventeen inches in length. This ſpecies is found in many parts of Europe. It is, however, by no means common in France, and has only been met with three or four times in England.

There are ſix or ſeven ſpecies of foreign birds of this kind; two or three of which, particularly the *hboubara* and the *rhaad*, (both African birds) are creſted, and different from ours by ſome varieties in their plumage.

THE COCK.] This bird, though perhaps the moſt common of all, is by no means ſufficiently known, except to thoſe who have made the productions of nature their peculiar ſtudy. So great indeed is the variety in this race of animals, that even the naturaliſt himſelf finds it difficult to point out its diſtinctive characters. If we take for the mark of the genus its four toes, what then becomes of the peculiar ſpecies which has five on each foot? If the erect and peculiar poſition of the tail be aſſumed, there is a ſpecies wholly deſtitute of this character. If we would ſay that the cock is only feathered to the lower joint of the leg, there are ſome breeds which are feathered even to the toes, and that of Japan has feathers even to the very nails. In fine, if we would claſs him among granivorous birds, we muſt allow ſome latitude even in this, ſince he devours greedily not only earth worms, but it many caſes both fiſh and fleſh.

Of all birds the cock ſeems to be the oldeſt companion of mankind, to have been firſt reclaimed from the foreſt, and taken to ſupply the accidental failure of the luxuries or neceſſaries of life. As he is thus longeſt under the care of man, ſo perhaps he exhibits the greateſt number of varieties, there being ſcarcely two birds of this ſpecies that exactly reſemble each other in plumage and form.

It is not well aſcertained when the cock was firſt made domeſtic in Europe; but it is generally agreed that we firſt had him in our weſtern world from the kingdom of Perſia. The cock is found wild in the iſland of Tinian, in many others of the Indian ocean, and in the woods on the coaſts of Malabar; his plumage is black and yellow, and his comb and wattles yellow and purple. There is another peculiarity alſo in thoſe of the Indian woods; their bones, which, when boiled with us, are white, as every body knows, in thoſe are as black as ebony. Whether this tincture proceeds from their food, as the bones are tinctured red by feeding upon madder, we leave to the diſcuſſion of others: ſatisfied with the fact, let us decline ſpeculation.

In their firſt propagation in Europe, there were diſtinctions then that now ſubſiſt no longer. The ancients eſteemed thoſe fowls whoſe plumage was reddiſh as invaluable; but as for the white it was conſidered as utterly unfit for domeſtic purpoſes. Theſe they regarded as ſubject to become a prey to rapacious birds; and leſs fruitful than the former. No animal in the world has greater courage than the cock, when oppoſed to one of his own ſpecies; and in every part of the world where refinement and poliſhed manners have not entirely taken place, cock-fighting is a principal diverſion. In China, India, the Philippine Iſlands, and all over the eaſt, cock-fighting is the ſport and amuſement even of kings and princes. With us it is declining every day; and it is to be hoped it will in time become only the paſtime of the loweſt vulgar. It is the opinion of many that we have a bolder and more valiant breed than is to be found elſewhere; but the truth is, they have cocks in China as bold, if not bolder than ours; and, what would ſtill be conſidered as valuable among cockers here, they have more ſtrength with leſs weight.

The egg of a common hen weighs one ounce ſix drams. Upon breaking the ſhell, a fine membrane is found, which lines the ſhell; next to this is the external white, which is the ſhape of the egg, and then the internal white, which is rather rounder, and which incloſes the yolk, which is quite round. Each of theſe parts is contained in a fine membrane.

With reſpect to the pretended cocks eggs, which are ſaid to be without a yolk, and which, if ſet under a hen, credulity reports as likely to produce a ſerpent, they are no other than the firſt production of a pullet too young for laying, or the laſt effort of an old hen, which has been exhauſted by her own fecundity.

The hen ſeldom clutches a brood of chickens above once a ſeaſon, though inſtances have been known in which they have produced two. The number of eggs a domeſtic hen will lay in the year are above two hundred, provided ſhe be well fed, and ſupplied with water and liberty. It matters not much whether ſhe be trodden by the cock or not; ſhe will continue to lay, although all the eggs of this kind can never by hatching be brought to produce a living animal.

As ſoon as an egg is laid, it begins to tranſpire, and loſes, in a little time, ſome grains of its weight. If it continues expoſed to the air, the inſide hardens, and contracts a bad flavour; but, to prevent this effect, it is only neceſſary to cover the outſide of the ſhell with a varniſh, or with any oily matter which will ſhield it from the air. It is obvious, however, that the varniſh muſt be removed if the eggs are deſigned for hatching.

The hen makes her neſt without any care, if left to herſelf; a hole ſcratched into the ground, among a few buſhes, is the only preparation ſhe makes for this ſeaſon of patient expectation. Nature, almoſt exhauſted by its own fecundity, ſeems to inform her of the proper time for hatching, which ſhe herſelf teſtifies by a clucking note, and by diſcontinuing to lay. If left entirely to herſelf, the hen would ſeldom lay above twenty eggs in the ſame neſt, without attempting to hatch them. While ſhe ſits, ſhe carefully turns her eggs, and even removes them to different ſituations; till at length, in about three weeks, the young brood begin to give ſigns of a deſire to burſt their confinement.

The formation of the embryo is curious. During the firſt day's incubation, and even when the egg has been under the hen a few hours, the head of the chicken may be ſeen gradually uniting itſelf to the ſpine of the back. On the ſecond day the firſt proceſſes of the vertebræ may be diſcerned like ſo many ſmall globules diſpoſed on each ſide of the ſpine. The firſt commencement of the wings and the umbilical veſſels may alſo be diſtinguiſhed by their dark colour. The neck and the breaſt alſo ſhew themſelves, and the head continues to increaſe in ſize. The third day the whole is more diſtinct and enlarged; and the heart, which is ſuſpended at the opening of the breaſt, is obſerved to beat; veins and arteries may alſo be perceived about the brain, and the ſpinal marrow begins to extend itſelf through the ſpine. The eyes are conſiderably formed on the fourth day. The pupil, the cryſtalline and vitreous humours may be diſtinctly ſeen. The wings increaſe, the thighs appear, and the whole body begins in ſome degree to be covered with fleſh. The fifth day the body is covered with a glutinous or unctuous fleſh, the heart is retained within a very fine membrane, which alſo extends itſelf all over the breaſt. The ſixth day the ſpinal marrow, in two diviſions, continues to advance along the trunk; the liver, which at firſt was whitiſh, becomes of a darker hue; both ventricles of the heart beat, and the body of the chicken is covered with ſkin, in which may be already diſcerned the points of the feathers. The beak may be diſcovered on the ſeventh day, and the brain, the wings, the thighs, and even the feet have acquired a perfect form. The lungs appear at the end of the ninth day; their colour is whitiſh. On the tenth the muſcles of the wings begin to form, the feathers continue to ſhoot out. It is not till the eleventh day that the arteries, which before were ſeparate, unite to the heart. The reſt of the proceſs conſiſts only in an increaſe and more perfect developement of the ſeveral parts, till they acquire ſufficient vigour to break the ſhell.

The ſtrongeſt and beſt chickens generally are the firſt candidates for liberty; the weakeſt come behind, and ſome even die in the ſhell. When all are produced, the hen leads them forth to provide for themſelves. Her affection and her pride ſeem then to alter her very nature, and correct her imperfections. No longer voracious or cowardly, ſhe abſtains from all food that her young can ſwallow, and flies boldly at every creature that ſhe thinks is likely to do them miſchief.

Ten or twelve chickens are the greateſt number that a good hen can rear and clutch at a time; but as this bears no proportion to the number of her eggs, ſchemes have been imagined to clutch all the eggs of an hen, and thus turn her produce to the greateſt advantage. The contrivance we mean, is the artificial method of hatching chickens in ſtoves, as is practiſed at Grand Cairo; or in a chymical elaboratory, properly graduated, as has been effected by Mr. Reaumur. At Grand Cairo, they thus produce ſix or ſeven thouſand chickens at a time; where, as they are brought forth in their mild ſpring, which is warmer than our ſummer, the young ones thrive without clutching. But it is otherwiſe in our colder and unequal climate; the little animals may, without much difficulty, be hatched from the ſhell; but they almoſt all periſh when excluded. The cock is a ſhort-lived animal; but how long theſe birds live, if left to themſelves, is not yet well aſcertained by any hiſtorian. As they are kept only for profit, and in a few years become unfit for generation, there are few that, from mere motives of curioſity, will make the tedious experiment of maintaining a proper number till they die. Aldrovandus hints their age to be ten years *; and it is probable that this may be its extent.

THE TURKEY.] If the common cock is the moſt uſeful bird in our poultry yard, the turkey is the moſt remarkable, as well for the beauty of the tail, as for the ſingular appearance of the head, and for thoſe habits which are almoſt peculiar to itſelf. It is difficult to determine the natal place of any animal, the ſpecies of which is generally diffuſed; but the weight of teſtimony inclines us to the opinion that the turkey is a native of the New Continent, and that it was not brought into Europe till the diſcovery of that part of the world.

With us, when young, it is one of the tendereſt of all birds; yet, in its wild ſtate, it is found in great plenty in the foreſts of Canada, which are covered with ſnow above three parts of the year. In their natural woods they are found much larger than in their ſtate of domeſtic captivity. They are much more beautiful alſo, their feathers being of a dark grey, bordered at the edges with a bright gold colour. Theſe the ſavages of the country weave into cloaks to adorn their perſons, and faſhion into fans and umbrellas, but never once think of taking into keeping animals that the woods furniſh them with in ſufficient abundance. Savage man ſeems to find a delight in precarious poſſeſſion. The hunting of the turkey, therefore, makes one of his principal diverſions; as its fleſh contributes chiefly to the ſupport of his family. When he has diſcovered the place of their retreat, which, in general, is near fields of nettles, or where there is plenty of any kind of grain, he takes his dog with him, which is trained to the ſport, and he ſends him into the midſt of the flock. The turkeys no ſooner perceive their enemy, than they ſet off running at full ſpeed, and with ſuch ſwiftneſs, that they leave the dog far behind them: he follows, nevertheleſs, 'and, ſenſible they muſt

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* The Editor has known game cocks which were upwards of ten years old, though they had fought many battles, and conſequently muſt have been greatly injured.

ſoon be tired, as they cannot go full ſpeed for any length of time, he, at laſt, forces them to take ſhelter in a tree, where they ſit quite ſpent and fatigued, till the hunter comes up, and, with a long pole, knocks them down one after the other.

This manner of ſuffering themſelves to be deſtroyed, argues no great inſtinct in the animal; and indeed, in their captive ſtate, they do not appear to be poſſeſſed of much. They ſeem a ſtupid, vain, querulous tribe, apt enough to quarrel among themſelves, yet without any weapons to do each other an injury. Every body knows the ſtrange antipathy the turkey-cock has to a red colour. But there is another method of encreaſing the animoſity of theſe birds againſt each other, which is often practiſed by boys, when they have a mind for a battle. This is no more than to ſmear over the head of one of the turkeys with dirt, and the reſt run to attack it with all the ſpeed of impotent animoſity: nay, two of them thus diſguiſed, will fight each other till they are almoſt ſuffocated with fatigue and anger.

But though ſo furious among themſelves, they are weak and cowardly againſt other animals, though far leſs powerful than they. The cock often makes the turkey keep at a diſtance; and they ſeldom venture to attack him but with united force, when they rather oppreſs him by their weight, than annoy him by their arms. There is no animal, how contemptible ſoever, that will venture boldly to face the turkey-cock, that he will not fly from. On the contrary, with the inſolence of a bully, he purſues any thing that ſeems to fear him, particularly lapdogs and children, to both which he ſeems to have a peculiar averſion.

The female ſeems of a milder, gentler diſpoſition. She lays eighteen or twenty eggs. Her young muſt be carefully fed with curd chopped with dock leaves; but as they grow older, they become more hardy, and follow the mother to conſiderable diſtances, in purſuit of inſect food, which they prefer to any other. When once grown up, turkeys are very hardy birds, and feed themſelves at very little expence to the farmer. Thoſe of Norfolk are ſaid to be the largeſt of this kingdom, weighing from twenty to thirty pounds. There are places, however, in the Eaſt Indies, where they are known only in their domeſtic ſtate, in which they grow to the weight of ſixty pounds.

Beſides the wild turkeys of America, there are a few foreign birds of this genus which deſerve notice. The moſt ſingular of theſe is the *horned turkey* of Bengal. It is not quite ſo large as our turkey, which it reſembles in moſt reſpects, except that the looſe flap which hangs down its throat is blue and not red. The breaſt and upper part of the back is a full red, and the other parts of the plumage brown marked with white ſpots. But its moſt remarkable characteriſtic conſiſts in a fleſhy, blue, callous ſubſtance like horn, which ſprings behind each eye, and gives it the full effect of a horned animal.

The *guan turkey* is a native of Braſil. It is not larger than a common turkey; the top of the head is furniſhed with long feathers, which the bird can erect as a creſt at pleaſure. The colour of the plumage is in general a browniſh black.

The *yacou turkey*, which is a native of Cayenne, is alſo creſted, as well as the *marail* turkey, which is found in the woods of Guiana. The plumage of theſe birds is alſo more ſplendid than that of ours.

THE PINTADA, OR GUINEA-HEN (See pl. XLIX.) is a very remarkable bird, and in ſome meaſure unites the characteriſtics of the pheaſant and the turkey. It has the fine delicate ſhape of the one, and the bare head of the other. To be more particular, it is about the ſize of a common hen; but as it is ſupported on longer legs, it looks much larger. It has a round back, with a tail turned downwards like a partridge. The head is covered with a kind of caſque; and the whole plumage is black or dark grey, ſpeckled with white ſpots. It has wattles under the bill, which do not proceed from the lower chap, as in cocks, but from the upper, which gives it a very peculiar air, while its reſtleſs gait and odd chuckling ſound diſtinguiſh it ſufficiently from all other birds whatever.

It is well known all over Europe, and we find it in different countries called by different names, from the place whence they had it. We have given it the name of that part of Africa from whence probably it was firſt brought.

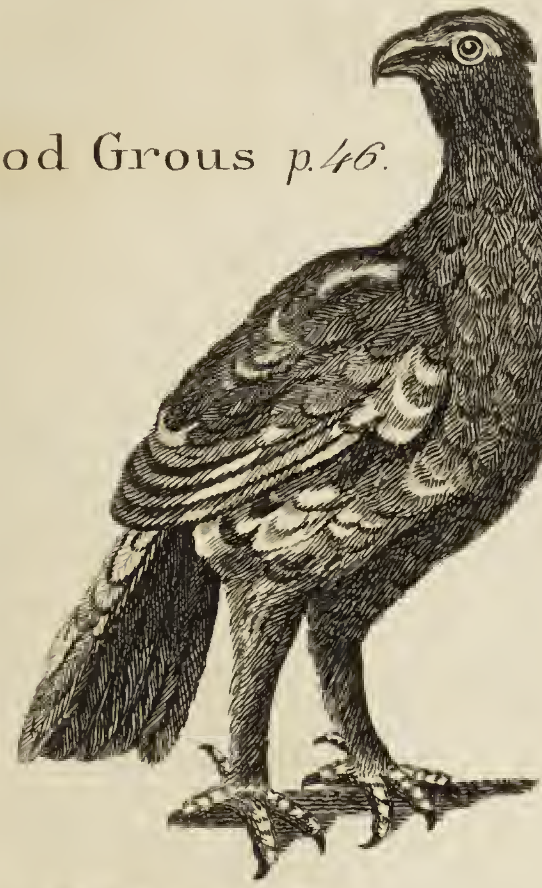
In many parts of their native country, they are ſeen in vaſt flocks together, feeding their young, and leading them in queſt of food. All their habits are like thoſe of the poultry kind, and they agree in every other reſpect, except that the male and female are ſo much alike, that they can hardly be diſtinguiſhed aſunder. Their eggs, like their bodies, are ſpeckled; in our climate, they lay but five or ſix in a ſeaſon; but they are far more prolific in their ſultry regions at home.

There is a ſpecies of this bird with a very beautiful creſt. There are alſo ſome other varieties which it would be tedious to deſcribe.

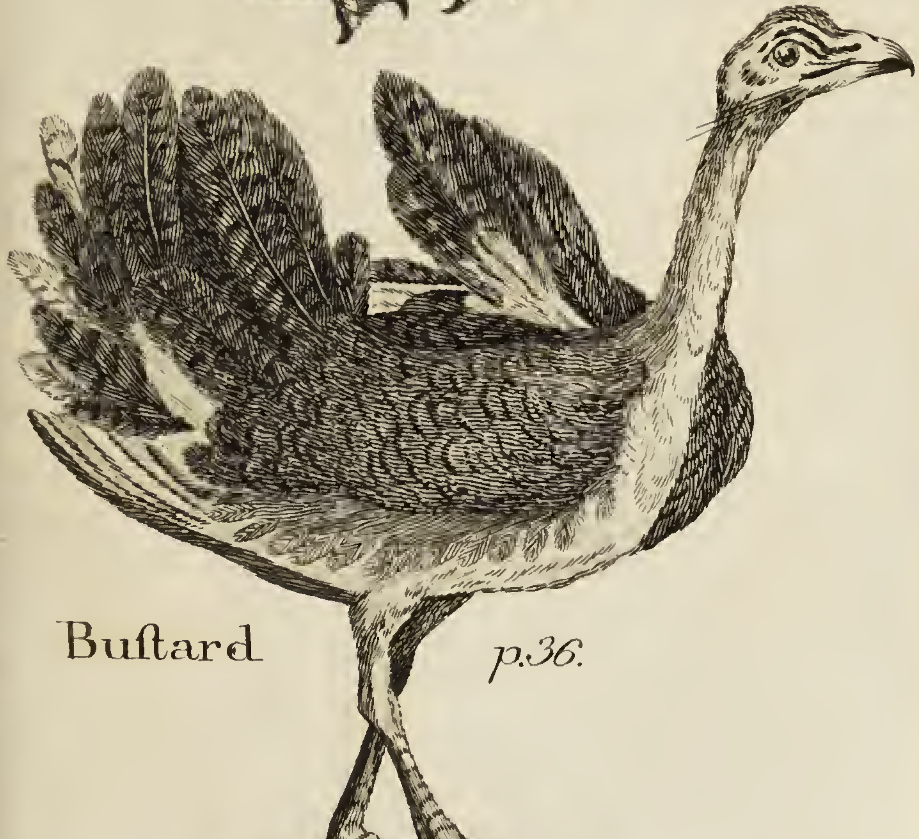
THE GROUS.] This genus of birds comprehends about ſeventeen ſpecies, foreign and domeſtic, all of which are diſtinguiſhable from other birds of the poultry order, by a naked ſcarlet ſkin above each eye. They have in other reſpects a great reſemblance to our domeſtic fowl, but in reality are a very different race. They are by no means ſo numerous at preſent in any part of Europe, as we have reaſon to believe they once were. The piny foreſts, and the barren heaths, are their natural retreats; and ſince cultivation has increaſed in theſe countries, they are only to be found on ſuch extenſive waſtes as the moors of Weſtmoreland, and the almoſt inacceſſible mountains in the moſt northern parts of Great Britain.

The *wood grous*, or *cock of the wood* (See pl. XLVII.) is the firſt of this genus in order and in conſequence. It is about the ſize of a turkey, and frequently weighs near fourteen pounds; but the female is much ſmaller. The head and neck are aſh colour, croſſed with black lines; the body and wings cheſnut brown, and the breaſt of a very gloſſy blackiſh green. The legs are ſtrong, and covered with brown feathers. The plumage of the female differs from this deſcription, in being red about the throat, and having the head, neck, and back croſſed with red and black bars; the belly barred with orange and black, with the tips of the feathers white, as are alſo the tips of the ſhoulders.

The *cock* of the *wood*, when in the foreſt, attaches himſelf principally to the oak and the pine-tree; the cones of the latter ſerving for his food, and the thick boughs for an habitation. He feeds alſo upon ants eggs, which ſeem a high delicacy to all birds of the poultry kind: cranberries are likewiſe often found in his crop. The female is much leſs than her mate, and entirely unlike him in plumage, ſo that ſhe might be miſtaken for a bird of another ſpecies; ſhe ſeldom lays more than ſix or ſeven eggs, which are white, and marked with yellow, of the ſize of a common hen's egg:

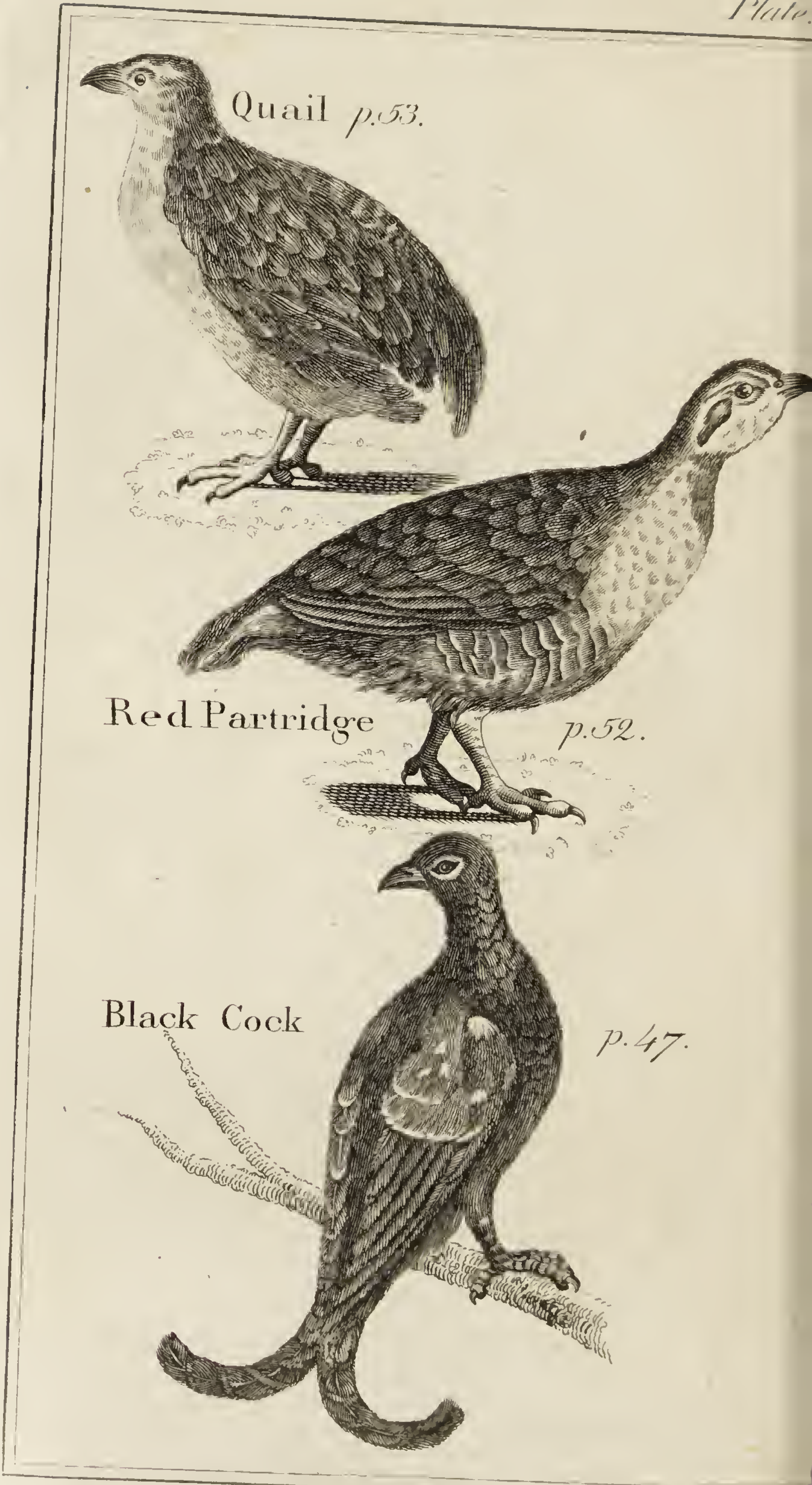


Wood Grous p. 46.



Buſtard p. 36.

Plate.


Quail p.53.
Red Partridge p.52.
Black Cock p.47.

ſhe generally lays them in a dry place and a moſſy ground; and when ſhe is obliged, during the time of incubation, to leave her eggs in queſt of food, ſhe covers them up ſo artfully, with moſs or dry leaves, that it is extremely difficult to diſcover them.

As ſoon as the young ones are hatched, they are ſeen running with extreme agility after the mother, though ſometimes they are not entirely diſengaged from the ſhell. They ſoon come to perfection: they are an hardy bird, their food lies every where before them, and it would ſeem that they ſhould encreaſe in great abundance. But this is not the caſe; their numbers are thinned by rapacious birds and beaſts of every kind; and ſtill more by their own ſalacious conteſts. They fight each other, like game cocks; and are ſo inattentive to their own ſafety, that it often happens that two or three of them are killed at a ſhot. It is probable, that in theſe conteſts, the bird which comes off victorious takes poſſeſſion of the female ſeraglio, as it is certain they have no faithful attachments. This ſpecies is now rarely found even in the Highlands of Scotland.

The *black grous*, or *black cock*, (See pl. LXVIII.) is much more common. It is found in many parts of Europe, and in moſt of the moors in the North of England. Its name almoſt furniſhes its deſcription, ſince the whole body is black; but it has another remarkable characteriſtic, which is, that its tail is forked. It is rather larger than a common fowl, and is in length twenty-four inches. Their conteſts are ſo furious, that in Courland, Livonia, &c. it is a common method of taking them, to aſſemble them together, by imitating the crowing of a black cock, and by having a figure prepared to imitate that animal in all its motions. The grous being collected in vaſt numbers from all parts, enter at firſt into a kind of ſportive combat, which preſently terminates in a real and bloody conteſt. When the combatants are ſo intent upon each other's deſtruction, that they fall an eaſy prey to their purſuers, and may even be knocked down with a ſtick. There is a variety of this ſpecies with a plain tail.

The *red grous*, or *moor-cock*, are alſo tolerably plentiful in thoſe parts where the *black grous* is to be found. It is rather ſmaller than the preceding ſpecies, being only fifteen inches and a half in length. The throat and back are reddiſh, with a black ſpot in each feather. The breaſt and belly are purpliſh brown, and the legs are covered with ſoft whitiſh feathers.

The *hazel grous* is a ſmaller bird, and appears of the ſame ſpecies with the former. It is a native of Germany.

The *pin-tailed grous*, ſo called from its narrow forked tail, is alſo of the ſame ſpecies with our *red* grous. It is the ſize of a partridge, and is found in France, Spain, Barbary, &c.

The *ptarmigan grous* is in length about fifteen inches. The bill is black, and the plumage is a pale aſh-colour, elegantly mottled with duſky ſpots. It is found in all the northern parts of Europe, and in the Highlands of Scotland, Orkneys, &c.

The foreign birds of this genus have all the ſame manners as the preceding, and only differ occaſionally in the plumage. There is a ſpecies in North America, which is called the *ruffed grous*, and which is diſtinguiſhed by a large ruff on the hind part of the neck, to be raiſed or depreſſed at pleaſure; it alſo has the head adorned with a creſt.

THE PEACOCK, by the common people of Italy, is ſaid to have the plumage of an angel, the voice of a devil, and the guts of a thief. Our firſt peacocks were brought from the Eaſt-Indies; and we are aſſured, that they are ſtill found in vaſt flocks, in a wild ſtate, in the iſlands of Java and Ceylon. The peacock has in ſome countries been eſteemed as an article of luxury, but whatever there may be of delicacy in the fleſh of a young peacock, it is certain an old one is very indifferent eating.

Its fame for delicacy, however, did not continue very long; for we find, in the time of Francis the Firſt, that it was a cuſtom to ſerve up peacocks to the tables of the great, with an intention not to be eaten, but only to be ſeen. Their manner was to ſtrip off the ſkin; and then preparing the body with the warmeſt ſpices, they covered it up again in its former ſkin, with all its plumage in full diſplay, and no way injured by the preparation. The bird thus prepared, was often preſerved for many years without corrupting; and it is aſſerted of the peacock's fleſh, that it keeps longer unputrefied than that of any other animal. To give a higher zeſt to theſe entertainments, on weddings particularly, they filled the bird's beak and throat with cotton and camphire, which they ſet on fire to amuſe and delight the company.

Like other birds of the poultry kind, the peacock feeds upon corn; but its chief predilection is for barley. There is, however, ſcarcely any food that it will not at times covet and purſue. In the indulgence of theſe capricious purſuits, walls cannot eaſily confine it; it ſtrips the tops of houſes of their tiles or thatch, it lays waſte the labours of the gardener, roots up his choiceſt ſeeds, and nips his favourite flowers in the bud. Thus its beauty but ill recompenſes for the miſchief it occaſions; and many of the more homely looking fowls are very deſervedly preferred before it.

The pea-hen ſeldom lays above five or ſix eggs in this climate before ſhe ſits. Ariſtotle deſcribes her as laying twelve; and it is probable, in her native climate, ſhe may be thus prolific: for it is certain, that in the foreſts where they breed naturally, they are numerous beyond expreſſion. The bird lives about twenty years; and not till its third year has it that beautiful variegated plumage that adorns its tail.

THE PHEASANT.] The name of this bird ſufficiently indicates its origin. The *pheaſant* is the bird of *Phaſis*, a river of Colchis, in Aſia Minor, whence they were firſt introduced into Europe.

Next to the peacock they are the moſt beautiful of birds, as well for the vivid colour of their plumes, as for their happy mixtures and variety. It is far beyond the power of the pencil to draw any thing ſo gloſſy, ſo bright, or points ſo finely blending into each other. We are told that when Crœſus, king of Lydia, was ſeated on his throne, adorned with royal magnificence, and all the barbarous pomp of eaſtern ſplendour, he aſked Solon if he had ever beheld any thing ſo fine! The Greek philoſopher, no way moved by the objects before him, or taking a pride in his native ſimplicity, replied, that after having ſeen the beautiful plumage of the pheaſant, he could be aſtoniſhed at no other finery.

In fact, nothing can ſatisfy the eye with a greater variety and richneſs of ornament than this beautiful creature. The iris of the eyes is yellow; and the eyes themſelves are ſurrounded with a ſcarlet colour, ſprinkled with ſmall ſpecks of black. On the fore-part of the head there are blackiſh feathers mixed with a ſhining purple. The top of the head and the upper part of the neck are tinged with a darkiſh green that ſhines like ſilk. In ſome, the top of the head is of a ſhining blue, and the head itſelf, as well as the upper part of the neck, appears ſometimes blue and ſometimes green, as it is differently placed to the eye of the ſpectator. The feathers of the breaſt, the ſhoulders, the middle of the back, and the ſides under the wings, have a blackiſh ground, with edges tinged of an exquiſite colour, which appears ſometimes black, and ſometimes purple, according to the different lights it is placed in; under the purple there is a tranſverſe ſtreak of gold colour. The tail, from the middle feathers to the root, is about eighteen inches long; the legs, the feet, and the toes, are of the colour of horn. There are black ſpurs on the legs, ſhorter than thoſe of a cock; there is a membrane that connects two of the toes together; and the male is much more beautiful than the female.

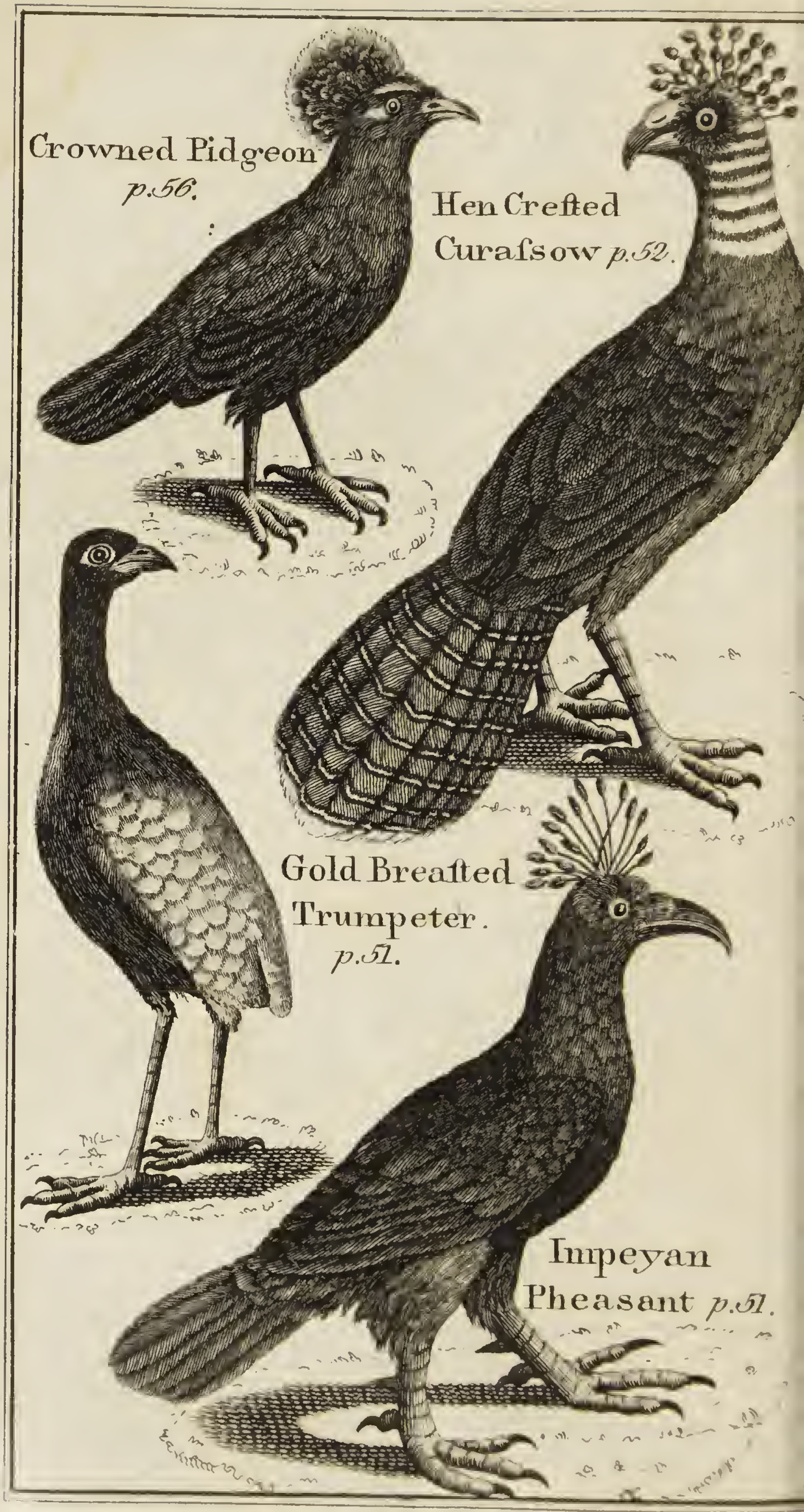
This bird, though ſo beautiful to the eye, is not leſs delicate when ſerved up to the table. Its fleſh is conſidered as the greateſt dainty; and when the old phyſicians ſpoke of the wholeſomeneſs of any viands, they made their compariſon with the fleſh of the pheaſant. In the woods the hen-pheaſant lays from eighteen to twenty eggs in a ſeaſon; but in a domeſtic ſtate ſhe ſeldom lays above ten. Its fecundity when wild is ſufficient to ſtock the foreſt; its beautiful plumage adorns it; and its fleſh retains a higher flavour from its unlimited freedom.

The pheaſant, when full grown, ſeems to feed indifferently upon every thing that offers. It is ſaid by a French writer, that one of the king's ſportſmen ſhooting at a parcel of crows, that were gathered round a dead carcaſe, to his great ſurprize upon coming up, found that he had killed as many pheaſants as crows. It is even aſſerted by ſome, that ſuch is the carnivorous diſpoſition of this bird, that when ſeveral of them are put together in the ſame yard, if one of them happens to fall ſick, or ſeems to be pining, that all the reſt will fall upon, kill, and devour it.

There is a *baſtard pheaſant* which is of a mixed breed between the pheaſant and the cock. The back is reddiſh, mottled with brown and white; the lower parts aſh-coloured, ſpotted with brown. There is alſo a variety ſuppoſed to be produced between the turkey and the pheaſant, and on that account called the *turkey pheaſant*. It is like the former, of a mingled colour.

There are about eight or ten foreign birds known of this genus. Among theſe the *painted*, or *golden pheaſant of China*, is moſt conſpicuous for its beauty. It is leſs than the common pheaſant, not being more than two feet nine inches

Plate .50


Crowned Pidgeon
p.56.
Hen Creſted
Curaſsow p.52.
Gold Breaſted
Trumpeter.
p.51.
Impeyan
Pheasant p.51.

inches long. The general colour of the plumage is crimſon; on the head is a beautiful yellow creſt, the feathers of which appear like ſilk. The back and rump are yellow; the ſcapulars are blue, the quills brown marked with yellow; the tail is twenty-three inches in length, and the colour is cheſnut, mottled with black. The hen is materially different, the general colour of her plumage being brown. It appears a hardy bird, and has been known to propagate with our common pheaſant.

The *argus pheaſant* is a magnificent bird. It receives its name from the quills being marked with eyes reſembling thoſe in the peacock's train. The top and hind part of the head and neck is a changeable blue; the back duſky, marked with reddiſh brown, the throat and breaſt a dull orange. It is the ſize of a cock turkey, and the two middle feathers of the tail are three feet in length. This bird, as well as the former, and the *ſuperb pheaſant*, the predominant colour of which is a beautiful green, is a native of China.

In plate L. we have given a drawing of the *Impeyan pheaſant* from Indoſtan. It is larger than a common fowl. On the head is an erect creſt of eighteen feathers, the longeſt three inches and a half in length. The feathers of the head and throat are green bronze, of the middle of the neck purple, with a copper gloſs. The back and wings are purple, the belly is black, with a green gloſs; the tail is a browniſh cinnamon colour.

There is another beautiful bird which ſome naturaliſts claſs with the pheaſant, while others make it of a different genus, that is, the TRUMPETER. That of which we have given a repreſentation in plate L. has the breaſt of a fine gloſſy gilded green, though the general colour of the plumage is black. In other birds of this kind the colour varies a little, as the wings have a mixture of white, &c. The ſize is that of a large fowl.

This ſingular bird inhabits South America. It is a moſt familiar animal, as it will follow like a ſpaniel the perſon that takes care of it. It is remarkable for the ſound it produces, which ſome imagine to proceed from the anus, or at leaſt from the belly. At firſt a ſhrill ſound ſeems to proceed from the mouth, which is anſwered by a noiſe from the belly, like the cooing of a dove, during which time the belly ſeems much agitated. It will feed on bread, fiſh, or fleſh, and it is accounted as pleaſant food as the pheaſant.

The Curassow is a bird which bears much reſemblance to the pheaſant, though naturaliſts have agreed in conſidering it as a diſtinct genus. It comprehends four or five ſpecies, with ſome varieties, but they are all of them foreign birds, and belong only to the warm climates of America. They are moſtly about the ſize of a ſmall turkey, and are generally diſtinguiſhed by a creſt of feathers, which curl at the ends. The moſt uſual colour of the plumage is black, but this varies in the different ſpecies.

In plate L. we have given a figure of a hen curaſſow. Of this the general colour is reddiſh brown, the bill yellow, with a brown tip, the ſides of the head covered with black feathers, the neck encircled with alternate rings of black and white, and the tail barred with white.

There is another ſpecies which is called the *cuſhew curaſſow*, or *cuſhew bird* *, from a large blue gibboſity, reſembling a cuſhew nut, and as large as a pear, which is ſituated at the baſe of the forehead.

In Peru and Mexico theſe birds are very numerous, both in a wild and a tame ſtate. The fleſh is excellent.

Of Partridges there are more than twenty ſpecies, foreign and domeſtic, but they may all be arranged under two diviſions, the grey and the red. The red partridge, (See pl. XLVIII.) is the largeſt of the two, and often perches upon trees; the grey, which is the common partridge in England, is moſt prolific, and always keeps on the ground.

The partridge ſeems to be a bird well known all over the world, as it is found in every country, and in every climate; as well in the frozen regions about the pole, as the torrid tracts under the equator. It even ſeems to adapt itſelf to the nature of the climate where it reſides. In Greenland, the partridge, which is brown in ſummer, as ſoon as the icy winter ſets in, begins to take a covering ſuited to the ſeaſon: it is then clothed with a warm down beneath; and its outward plumage aſſumes the colour of the ſnows amongſt which it ſeeks its food. The manners of the partridge in moſt circumſtances, reſemble all thoſe of poultry in general; but their cunning and inſtinct ſeems ſuperior to thoſe of the larger kinds. Perhaps, as they live in the very neighbourhood of their enemies, they have more frequent occaſion to put their little arts in practice, and learn, by habit, the means of evaſion or ſafety. Whenever, therefore, a dog or other formidable animal approaches their neſt, the female uſes every means to draw him away. She keeps juſt before him, pretends to be incapable of flying, juſt hops up, and then falls down before him, but never goes off ſo far as to diſcourage her purſuer. At length, when ſhe has drawn him entirely away from her ſecret treaſure, ſhe at once takes wing, and leaves him to gaze after her, in deſpair.

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* If I am not miſtaken, there is one of them now to be ſeen, with other curious birds, at Exeter Exchange. Editor.

After the danger is over, and the dog withdrawn, ſhe then calls her young, who aſſemble at once at her cry, and follow where ſhe leads them. There are generally from ten to fifteen in a covey; and, if unmoleſted, they live from fifteen to ſeventeen years.

The *francolin* is one of the moſt beautiful ſpecies of partridge. It is ſometimes found in the South of Spain, but is very common in Barbary[*].

There is alſo a *bare-necked partridge* and a ſpecies with a hackle like that of a cock.

THE QUAIL (See pl. XLVIII.) is a bird much ſmaller than any of the former, being not above half the ſize of a partridge. The feathers of the head are black, edged with ruſty brown; the breaſt is of a pale yellowiſh red, ſpotted with black; the feathers on the back are marked with lines of pale yellow, and the legs are of a pale hue.

The quail is by all known to be a bird of paſſage; and yet, if we conſider its heavy manner of flying, and its dearth of plumage, with reſpect to its corpulence, we ſhall be ſurpriſed how a bird ſo apparently ill qualified for migration, ſhould take ſuch extenſive journeys. Nothing, however, is more certain. "When we ſailed from Rhodes to Alexandria," ſays Bellonius, "about autumn, many quails, flying, "from the north to the ſouth, were taken in our ſhip; "and ſailing at ſpring-time the contrary way, from the "ſouth to the north, I obſerved them on their return, "when many of them were taken in the ſame manner." This account is confirmed by many others; who aver, that they chooſe a north wind for theſe adventures; the ſouth wind being very unfavourable, as it retards their flight, by moiſtening their plumage. They then fly two by two; continuing, when their way lies over land, to go faſter by night than by day: and to fly very high, to avoid being ſurpriſed, or ſet upon by birds of prey. It is now, however, aſſerted by ſome, that the quail only migrates from one province of a country to another. For inſtance, that in England, they fly from the inland counties, to thoſe bordering on the ſea, and continue there all the winter.

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[*] See Lempriere's Tour to Morocco, p. 93, a book which cannot be too much commended for its various and entertaining information. Ed.

Theſe birds are much leſs prolific than the partridge; ſeldom laying more than ſix or ſeven whitiſh eggs, marked with ragged, ruſt-coloured ſpots. Quail-fighting was a favourite amuſement among the Athenians; they abſtained from the fleſh of this bird, deeming it unwholeſome, as ſuppoſing that it fed upon the white hellebore; but they reared great numbers of them, for the pleaſure of ſeeing them fight; and ſtaked ſums of money, as we do with cocks, upon the ſucceſs of the combat. Faſhion, however, has at preſent changed with regard to this bird; we take no pleaſure in its courage, but its fleſh is conſidered as a very great delicacy.

In South America there are creſted quails; and in different parts of the world their plumage greatly varies. Ten or twelve different ſpecies have been enumerated; but the common quail only is known in France and England.

THE DOVES, OR PIGEONS are by ſome naturaliſts made a diſtinct order of birds, and indeed it muſt be confeſſed that the pigeon has little affinity with any of the preceding, except its domeſtic habits, and its utility to man. As the order, however, conſiſts of too ſmall a number of ſpecies, and thoſe too well known to require a diſtinct chapter, we ſhall add whatever occurs upon the ſubject to the preſent ſection of our ornithology.

THE TAME PIGEON, and all its beautiful varieties, is ſaid to derive its origin from the ſtock dove, the Engliſh name, implying its being the ſtock or ſtem whence the other domeſtic kinds have been propagated. This bird, in its natural ſtate, is of a deep bluiſh aſh-colour; the breaſt daſhed with a fine changeable green and purple; its wings marked with two black bars; and the tail barred near the end with black. Theſe are the colours of the pigeon in a ſtate of nature; and from theſe ſimple tints has man by art propagated a variety that words cannot deſcribe, nor even fancy ſuggeſt. However, nature ſtill perſeveres in her great outline; and though the form, colour, and even the fecundity of theſe birds may be altered by art, yet their natural manners and inclinations continue ſtill the ſame.

The dove-houſe pigeon, as is well known, breeds every month; it lays two white eggs, which moſt uſually produce young ones of different ſexes. From three or four o'clock in the evening, till nine the next day, the female ſits on the eggs; ſhe is then relieved by the male, who takes his place from ten till three, while his mate is feeding abroad. In this manner they ſit alternately till the young are excluded, which is from eighteen to twenty days, according to the warmth of the ſeaſon. If, during this term, the female delays to return at the expected hour, the male follows and drives her to the neſt; and, ſhould he in his turn be dilatory, ſhe retaliates with equal ſeverity.

The hen pigeon is, however, ſo conſtant to her eggs, that one, whoſe legs were frozen and dropped off, continued to ſit, notwithſtanding the pain which ſhe endured with the loſs of her limbs, till her young were hatched. Her legs were frozen by the neſt being too near the entrance of the dove-cote, and conſequently expoſed to the cold air.

The young ones when hatched require no food for the three firſt days, only wanting to be kept warm, which is an employment the female takes entirely upon herſelf. During this period ſhe never ſtirs out, except for a few minutes to take a little food. From this they are fed for eight or ten days, with corn or grain of different kinds, which the old ones gather in the fields, and keep treaſured up in their crops, whence they throw it up again into the mouths of their young ones, who very greedily demand it.

So great is the produce of this bird in its domeſtic ſtate, that near fifteen thouſand may, in the ſpace of four years, be produced from a ſingle pair. Thoſe pigeons which are called carriers, and are uſed to convey letters, are eaſily diſtinguiſhed from all others by their eyes, which are compaſſed about with a broad circle of naked white ſkin, and by being of a dark blue or blackiſh colour. It is from their attachment to their native place, and particularly where they have brought up their young, that theſe birds are employed in ſeveral countries as the moſt expeditious carriers. They are firſt brought from the place where they were bred, and whither it is intended to ſend them back with information. The letter is tied under the bird's wing, and, after feeding it well, leſt it ſhould ſtop by the way to eat, it is let looſe, to return. The little animal no ſooner finds itſelf at liberty, than its paſſion for its native ſpot directs all its motions. It is ſeen, upon theſe occaſions, flying directly into the clouds to an amazing height; and then, with the greateſt certainty and exactneſs, directing itſelf by ſome ſurprizing inſtinct towards home, which lies ſometimes at many miles diſtance. It is ſaid, that in the ſpace of an hour and a half, they ſometimes perform a journey of forty miles; and Thevenot relates, that they commonly travel from Aleppo to Alexandria, above eighty-eight miles, in leſs than ſix hours.

The varieties of the tame pigeon are ſo numerous, that it would be a vain attempt to mention them: ſo much is the figure and the colour of this bird under human controul, that pigeon-fanciers, by coupling a male and female of different ſorts, can breed them, as they expreſs it, to a feather. Hence we have the various names of croppers, carriers, jacobines, powters, runts, tumblers, turbits, &c. There are many ſpecies of the wild pigeon differing from the ſtock-dove. The RING-DOVE is of this number; a good deal larger than the former, and building its neſt with a few dry ſticks in the boughs of trees. This ſeems a bird much fonder of its native freedom than the former: and attempts have been frequently made to render it domeſtic: but they have hitherto proved fruitleſs; for though their eggs have been hatched by the tame pigeon in a dove-houſe, yet, as ſoon as they could fly, they always betook themſelves to the woods where they were firſt produced.

There are a variety of foreign birds, which belong to the pigeon ſpecies, but none of them are remarkable enough to require inſertion in this abridgement, except that which is denominated by Edwards the *large crowned pigeon of the Eaſt Indies.* Though as large as a turkey, this bird evidently belongs to the pigeon ſpecies. It has the beak, the head, the legs, the form, the voice, and manners of this ſpecies. It is a native of the iſle of Banda. There appears no diſtinction between the males and females, and the latter do not lay in theſe cold climates.

In plate L. we have given a print of the *leſſer crowned pigeon*, which is alſo a native of India. It is the ſize of a common pigeon. The head and neck of this bird are black;

the back, rump, and tail a deep green; the breaſt and belly violet, and the creſt a gilded red.

THE TURTLE-DOVE is a ſmaller, but a much ſhyer bird than any of the former. It may eaſily be diſtinguiſhed from the reſt by the iris of the eye, which is of a fine yellow, and by a beautiful crimſon circle that encompaſſes the eye-lids. The fidelity of theſe birds is noted; and a pair being put in a cage, if one dies, the other will not ſurvive it. The turtle-dove is a bird of paſſage, and few or none remain in our northern climates in winter. They fly in flocks when they come to breed here in ſummer, and delight in open, mountainous, ſandy countries. They build their neſts in the midſt of woods; but may yet be tamed, and even brought to propagate in dove-houſes like the tame-pigeon, and ſeveral varieties are produced in this artificial exiſtence. They will even pair with pigeons, and thus produce a mixed one.

Among the foreign birds of this ſpecies, the moſt remarkable is the *ground turtle*, or *ſmall turtle dove*, of St. Domingo. It is not above the ſize of the common creſted lark, or a little better than ſix inches long. The upper parts of the body are aſh-coloured, the lower parts reddiſh, ſpotted with brown. It is excellent eating, and on this account, and for its ſize, it has acquired the name of ortolan, being nearly about the ſame weight as the European ortolan.

CHAP. III.

Of Birds of the Pie Order—The Raven—The Carrion CROW—*The Rook—The Royſton Crow—The Jackdaw—The Corniſh Chough—The Hottentot Crow—The Bald Crow—The variegated, and white-breaſted Crow—The Magpie—The Jay—The Chineſe, Peruvian, Canada, Siberian, and yellow-bellied Jays—The Nutcracker—The* ROLLER—*The* HOOPOE—*The Promerops—The* KING'S FISHER—*The* CUCKOO—*The* WOODPECKER—*The* ORIOLE—*The Nuthatch—The* BEE-EATER—*The* WRYNECK—*The* CREEPER—*The* TOUCAN—*The* MOTMOT—*The* HORNBILL—*The Rhinoceros, Helmet, and Pied Hornbills—The* PARROT—*The Macaw, the Lory, the Parakeet, and Cockatoo—The* ANI—*The* WATTLE *Bird—The* GRACKLE—*The* BIRD *of* PARADISE—*The King Bird of Paradiſe—The magnificent Bird of Paradiſe—The* BEEF-EATER—*The* CURACUI—*The* BARBET—*The* JACAMAR—*The* TODY—*The* HUMMING-BIRD.

The Order of Pies.

THE CROW.] THE *raven*, the *carrion-crow*, and the *rook*, are birds ſo well known, that a long deſcription would but obſcure our ideas of them. The raven is the largeſt of the three, and diſtinguiſhed from the reſt, not only by his ſize, but by his bill being ſomewhat more hooked than that of the reſt. As for the carrion-crow and the rook, they ſo ſtrongly reſemble each other, both in make and ſize, that they are not eaſily diſtinguiſhed aſunder. The chief difference to be found between them lies in the bill of the rook; which, by frequently being thruſt into the ground to fetch out grubs and earth-worms, is bare of feathers as far as the eyes, and appears of a whitiſh colour. It differs alſo in the purple ſplendour or gloſs of its feathers, which in the carrion-crow are of a more dirty black. Nor is it amiſs to make theſe diſtinctions, as the rook has but too frequently ſuffered for its ſimilitude to the carrion-crow; and thus an harmleſs bird, that feeds only upon inſects and corn, has been deſtroyed for another that feeds ſeeds upon carrion, and is often deſtructive among young poultry.

The *raven* is a bird found in every region of the world; ſtrong and hardy, he is uninfluenced by the changes of the weather; and when other birds ſeem numbed with cold, or pining with famine, the raven is active and healthy, buſily employed in prowling for prey, or ſporting in the coldeſt atmoſphere. As the heats at the line do not oppreſs him, ſo he bears the cold of the polar countries with equal indifference. He is ſometimes indeed ſeen milk-white, and this may probably be the effect of the rigorous climates of the north. A raven may be reclaimed to almoſt every purpoſe to which birds can be converted. He may be trained up for fowling like an hawk; he may be taught to fetch and carry like a ſpaniel; he may be taught to ſpeak like a parrot; but the moſt extraordinary of all is, that he can be taught to ſing like a man. I have heard (ſays a modern author) a raven ſing the Black Joke with great diſtinctneſs, truth, and humour.

Indeed, when the raven is taken as a domeſtic, he has many qualities that render him extremely amuſing. Buſy, inquiſitive, and impudent, he goes every where, affronts and drives off the dogs, plays his pranks on the poultry, and is particularly aſſiduous in cultivating the good-will of the cook maid, who ſeems to be the favourite of the family. But then, with the amuſing qualities of a favourite, he often alſo has the vices and defects. He is a glutton by nature, and a thief by habit. He does not confine himſelf to petty depredations on the pantry or the larder; he ſoars at more magnificent plunder; at ſpoils which he can neither exhibit nor enjoy; but which, like a miſer, he reſts ſatisfied with having the ſatisfaction of ſometimes viſiting and contemplating in ſecret. A piece of money, a tea-ſpoon, or a ring, are always tempting baits to his avarice; theſe he will ſlily ſeize upon, and, if not watched, will carry to his ſavourite hole.

In his wild ſtate, the raven is an active and greedy plunderer. Nothing comes amiſs to him. If in his flights he perceives no hopes of carrion, and his ſcent is ſo exquiſite, that he can ſmell it at a vaſt diſtance, he then contents himſelf with more unſavory food, fruits, inſects, and the accidental deſert of a dunghill. This bird chiefly builds its neſt in trees, and lays five or ſix eggs of a pale green colour, marked with ſmall browniſh ſpots, Notwithſtanding the injury theſe birds do in picking out the eyes of ſheep and lambs, when they find them ſick and helpleſs, a vulgar reſpect is paid them as being the birds that fed the prophet Elijah in the wilderneſs. This prepoſſeſſion in favour of the raven, is of very ancient date, as the Romans themſelves, who thought the bird ominous, paid it, from motives of fear, the moſt profound veneration. One of theſe that had been kept in the temple of Caſtor, as Pliny informs us, flew down into the ſhop of a taylor, who took much delight in the viſits of his new acquaintance. He taught the bird ſeveral tricks; but particularly to pronounce the name of the emperor Tiberius and the whole royal family. The taylor was beginning to grow rich by thoſe who came to ſee this wonderful raven, till an envious neighbour, diſpleaſed at the taylor's ſucceſs, killed the bird, and deprived the taylor of his future hopes of fortune. The Romans, however, took the poor taylor's part; they puniſhed the man who offered the injury, and gave the raven all the honours of a magnificent interment.

Birds in general live longer than quadrupeds; and the raven is ſaid to be one of the moſt long-lived of the number. Some of them have been known to live near an hundred years. This animal, indeed, ſeems poſſeſſed of thoſe qualities that generally produce longevity, a good appetite, and great exerciſe.

The *carrion-crow* reſembles the raven in its appetites, its laying, and manner of bringing up its young. It only differs in being leſs bold, leſs docile, and leſs favoured by mankind.

The *rook* leads the way in another, but a more harmleſs train, that have no carnivorous appetites, but only feed upon inſects and corn. The *Royſton crow* is about the ſize of the two former. The breaſt, belly, back, and upper part of the neck, being of a pale aſh-colour; the head and wings gloſſed over with a fine blue. He is a bird of paſſage, viſiting this kingdom in the beginning of winter, and leaving it in the ſpring. He breeds, however, in different parts of the Britiſh dominions; and his neſt is common enough in trees in Ireland.

The *jackdaw* is black like all the former, but aſh-coloured on the breaſt and belly. He is not above the ſize of a pigeon. He is docile and loquacious. His head being large for the ſize of his body, which, as has been remarked, argues him ingenious and crafty. He builds in ſteeples, old caſtles, and high rocks, laying five or ſix eggs in a ſeaſon. The *red legged crow*, or *Corniſh chough* (See pl. LI.) is like a jackdaw, but larger, and almoſt the ſize of a crow. The feet and legs are long, like thoſe of a jackdaw, but of a red colour; and the plumage is black all over. It frequents rocks, old caſtles, and churches, by the ſea-ſide, like the daw; and with the ſame noiſy aſſiduity. It is only ſeen along the weſtern coaſts of England. Theſe are birds very ſimilar in their manners, feeding on grain and inſects, living in ſociety, and often ſuffering general caſtigation from the flock for the good of the community.

There are ſeveral foreign birds which bear a near relation to the crow. The *Hottentot crow* of the Cape of Good Hope is remarkable for two bunches of ſtiff hair about three inches long, which ſpring out from the corners of his mouth, and which have the full effect of a pair of whiſkers. The bird itſelf is not above the ſize of a blackbird.

The *Bald crow*, which inhabits Cayenne, is as ſingular for an oppoſite quality, which is, that the fore part of the head, as far as the crown, is entirely bare of feathers.

In Mexico there are *Pied ravens*, and in Norway and Iceland there are ſome which are white. The *Variegated crow* of Ferroe in its plumage ſomewhat reſembles the magpie; and the *white breaſted crow*, which inhabits China, Indoſtan and Africa, is ſtill more beautiful. There are almoſt as many varieties in the Daw ſpecies.

The Magpie is too well known to need a deſcription. Indeed, were its other accompliſhments equal to its beauty, few birds could be put in competition. Its black, its white, its green and purple, with the rich and gilded combination of the gloſſes on its tail, are as fine as any that adorn the moſt beautiful of the feathered tribe. But it has too many of the qualities of a beau, to depreciate theſe natural perfections: vain, reſtleſs, loud, and quarrelſome, it is an unwelcome intruder every where; and never miſſes an opportunity, when it finds one, of doing miſchief.

The magpie bears a great reſemblance to the butcher-bird in its bill, which has a ſharp proceſs near the end of the upper chap, as well as in the ſhortneſs of its wings, and the form of the tail, each feather ſhortening from the two middlemoſt. But it agrees ſtill more in its ood, living not only upon worms and inſects, but alſo upon ſmall birds, when they can be ſeized. A wounded lark, or a young chicken ſeparated from the hen, are ſure plunder; and the magpie will even ſometimes ſet upon and ſtrike a blackbird.

The ſame inſolence prompts it to teize the largeſt animals when its inſults can be offered with ſecurity. They often are ſeen perched upon the back of an ox or a ſheep, pecking up the inſects to be found there, chattering and tormenting the poor animal at the ſame time, and ſtretching out their necks for combat, if the beaſt turns its head backward to reprehend them. They ſeek out alſo the neſts of birds; and, if the parent eſcapes, the eggs make up for the deficiency: the thruſh and the blackbird are but too frequently robbed by this aſſaſſin, and this in ſome meaſure cauſes their ſcarcity.

No food ſeems to come amiſs to this bird; it ſhares with ravens in their carrion, with rooks in their grain, and with the cuckoo in birds eggs: but it ſeems poſſeſſed of a providence ſeldom uſual with gluttons: for when it is ſatisfied for the preſent, it lays up the remainder of the feaſt for another occaſion. It will even in a tame ſtate hide its food when it has done eating, and after a time return to the ſecret hoard with renewed appetite and vociferation.

In all its habits it diſcovers a degree of inſtinct unuſual to other birds. Its neſt is not leſs remarkable for the manner in which it is compoſed, than for the place the magpie takes to build it in. The neſt is uſually placed conſpicuous enough, either in the middle of ſome hawthorn buſh, or on the top of ſome high tree. The place, however, is always found difficult of acceſs; for the tree pitched upon uſually grows in ſome thick hedge-row, fenced by brambles at the root; or ſometimes one of the higher buſhes is fixed upon for the purpoſe. When the place is thus choſen as inacceſſible as poſſible to men, the next care is to fence the neſt above, ſo as to defend it from all the various enemies of the air. The kite, the crow, and the ſparrow-hawk, are to be guarded againſt; as their neſts have been ſometimes plundered by the magpie, ſo it is reaſonably feared that they will take the firſt opportunity to retaliate. To prevent this, the magpie's neſt is built with ſurpriſing labour and ingenuity.

The body of the neſt is compoſed of hawthorn branches; the thorns ſticking outward, but well united together by their mutual inſertions. Within it is lined with fibrous roots, wool, and long graſs, and then nicely plaiſtered all round with mud and clay. The body of the neſt being thus made firm and commodious, the next work is to make the canopy which is to defend it above. This is compoſed of the ſharpeſt thorns, woven together in ſuch a manner as to deny all entrance except at the door, which is juſt large enough to permit egreſs and regreſs to the owners. In this fortreſs the male and female hatch and bring up their brood with ſecurity, ſheltered from all attacks but thoſe of the climbing ſchool-boy, who often finds his torn and bloody hands too dear a price for the eggs or the young ones. The magpie lays ſix or ſeven eggs, of a pale green colour, ſpotted with brown.

This bird, in its domeſtic ſtate, preſerves its natural character with ſtrict propriety. The ſame noiſy, miſchievous habits attend it to the cage that marked it in the woods; and being more cunning, ſo it is alſo a more docile bird than any other taken into keeping. Thoſe who are deſirous of teaching it to ſpeak, have a fooliſh cuſtom of cutting its tongue, which only puts the poor animal to pain, without improving its ſpeech in the ſmalleſt degree. Its ſpeaking is ſometimes very diſtinct; but its ſounds are too thin and ſharp to be an exact imitation of the human voice, which the hoarſe raven and parrot can counterfeit more exactly.

There are ſome foreign birds of this ſpecies, but they are ſcarcely deſerving of notice.

To this tribe we may refer the *Jay*, which is one of the moſt beautiful of the Britiſh birds. The forehead is white, ſtreaked with black; the head is covered with very long feathers, which it can erect into a creſt at pleaſure; the whole neck, back, breaſt, and belly, are of a faint purple, daſhed with grey; the wings are moſt beautifully barred with a lovely blue, black, and white; the tail is black, and the feet of a pale brown. Like the magpie it feeds upon fruits, will kill ſmall birds, and is extremely docile.

Many of the foreign birds of the jay kind are exceedingly beautiful. The *Chineſe Jay* is of two kinds, the *red-billed* and that with a bluiſh bill. They are both elegant birds, their plumage being finely varied with patches of a fine velvet black, particularly about the head and throat. The *Peruvian* jay is of a tender green, which by inſenſible ſhades, aſſumes a bluiſh caſt in different parts of the body. The *Brown jay* of *Canada* and the *Siberian jay* are leſs remarkable. At *Cayenne* there are two other remarkable ſpecies, one of which has three white ſpots on each ſide of the head; and the other, which is called the *yellow bellied jay*, is further diſtinguiſhed by a golden ſtreak upon the crown of the head.

The Nut-cracker is by ſome naturaliſts conſidered as of a diſtinct genus, by others it is claſſed with the crow; though in its manners it moſt reſembles the jay, laying up a ſtore of nuts and acorns, and inhabiting the pine foreſts like that bird. It is the ſize of a magpie, and the general colour of its plumage is a ruſty brown, marked with triangular white ſpots. They are very plenty in Germany, and are rarely ſeen in England.

THE ROLLER is a genus of birds not leſs conſpicuous for beauty than any that has been mentioned. The *Garrulous Roller* (See pl. LI.) ſo called from its chattering noiſe, is the only ſpecies with which the inhabitants of Europe are acquainted. It is the ſize of a jay. The head, neck, and breaſt are of a light bluiſh green; the upper part of the body of a reddiſh brown; the tail is forked, and of a light blue; the legs are remarkably ſhort. It is a bird of paſſage which however ſeldom viſits England.

The *Chineſe*, the *Cayenne*, the *Abyſſinian Rollers* are all diſtinguiſhed by the brilliancy of their plumage, but differ little in any material reſpect from the preceding.

If we aſcend in the ſcale of beauty, the next bird that demands our attention is the HOOPOE. (See pl. LII.) Of this there is only one ſpecies known to the Europeans, which is however diffuſed over the whole of the Old Continent. It weighs about twelve ounces, and is twelve inches in length, the extent of its wings being nineteen inches acroſs. The bill is long and black. The neck is pale reddiſh brown; the breaſt and belly white; the leſſer coverts of the wing light brown; the back, ſcapulars and wings croſſed with black and white, the rump white, and the tail white, marked with black in the form of a creſcent. But the diſtinguiſhing character is a beautiful creſt of about two inches high, which is of a pale orange tipped with black. The food of this bird is inſects. It is in ſome places accounted good eating.

In *Madagaſcar* there is found another ſpecies of Hoopoe. The *Promerops* alſo which is found in South America and the ſouthern parts of Africa and India is generally conſidered as a ſpecies of Hoopoe. In pl. LV. we have exhibited that ſpecies which is called the grand Promerops. The body is the ſize of a pigeon, though the whole bird, including the tail, meaſures nearly four feet. The head, hind part of the neck, and upper part of the belly, are of a ſhining green; the reſt of the plumage black with a gloſs of violet. The ſcapular feathers, which are erect, are black, with the ends and under parts ſhining green. Beſides theſe, on each ſide of the tail are ſix falciform feathers of a greeniſh brown, and there is a tuft of feathers which hangs over each thigh. This bird is a native of New Guinea.

THE KING-FISHER, is a bird better known in England than the preceding, and is perhaps the moſt elegant bird which is produced in theſe northern climates.

The king-fiſher, (See pl. LXX.) is not much larger than a ſwallow; its ſhape is compact; the legs however are diſproportionably ſmall, and the bill diſproportionably long; it is two inches from the baſe to the tip; the upper chap black, and the lower yellow; but the colours of this bird atone for whatever is inelegant in its form; the crown of the head and the coverts of the wings are of a deep blackiſh green, ſpotted with bright azure; the back and tail are of the moſt reſplendent azure; the whole under ſide of the body is orange coloured; a broad mark of the ſame paſſes from the bill beyond the eyes; beyond that is a large white ſpot: the tail is ſhort, and conſiſts of twelve feathers of a rich deep blue; the feet are of a reddiſh yellow, and the three joints of the outmoſt toe adhere to the middle toe, while the inner toe adheres only by one.

From the diminutive ſize, the ſlender ſhort legs, and the beautiful colours of this bird, no perſon would ſuppoſe it one of the moſt rapacious little animals that ſkims the deep. Yet it is for ever on the wing, and feeds on fiſh, which it takes in ſurpriſing quantities, when we conſider its ſize and figure. It chiefly frequents the banks of rivers, and takes its prey after the manner of the oſprey, balancing itſelf at a certain diſtance above the water for a conſiderable ſpace, then darting into the deep, and ſeizing the fiſh with inevitable certainty. While it remains ſuſpended in the air, in a bright day, the plumage exhibits a beautiful variety of the moſt dazzling and brilliant colours.

The king-fiſher builds its neſt by the river-ſide in a hole which it burrows out itſelf, or in the deſerted hole of a rat. In theſe holes, which, from the remains of fiſh brought there, are very fœtid, the king-fiſher is often found with from five eggs to nine. There the female continues to hatch even though diſturbed; and though the neſt be robbed, ſhe will again return and lay there. The male, whoſe fidelity exceeds even that of the turtle, brings her large proviſions of fiſh while ſhe is thus employed; and ſhe, contrary to moſt other birds, is found plump and fat at that ſeaſon.

The ancients have had their fables concerning this bird, and ſo have the modern vulgar. It is an opinion generally received among them, that the fleſh of the king-fiſher will not corrupt, and that it will even baniſh all vermin. This has no better foundation than that which is ſaid of its always pointing, when hung up dead, with its breaſt to the north. The only truth which can be affirmed of this bird when killed is, that its fleſh is utterly unfit to be eaten; while its beautiful plumage preſerves its luſtre longer than that of any other bird we know.

Of this bird there are about thirty-ſix ſpecies foreign and domeſtic.

THE CUCKOO.] From theſe elegant animals we proceed to one, which, if it cannot boaſt much variety and beauty of plumage, is yet conſpicuous for the lightneſs and elegance of its form, and for its peculiar habits. This ſingular bird, which is ſomewhat leſs than a pigeon, and of a greyiſh colour, is diſtinguiſhed from all other birds, by its round prominent noſtrils. Having diſappeared all the winter, it diſcovers itſelf in our country early in the ſpring, by its well known call. Its note is heard earlier or later as the ſeaſon ſeems to be more or leſs forward, and the weather more or leſs inviting. From the cheerful voice of this bird the farmer may be inſtructed in the real advancement of the year. His note is pleaſant though uniform; and, from an aſſociation of ideas, ſeldom occurs to the memory without reminding us of the ſweets of ſummer.

The female cuckoo makes no neſt of her own. She repairs for that purpoſe to the neſt of ſome other bird, generally the water-wagtail or hedge-ſparrow, and having devoured the eggs of the owner, lays her own in their place. She uſually lays but one, which is ſpeckled, and of the ſize of a blackbird's. This the fond fooliſh bird hatches with great aſſiduity, and, when excluded, finds no difference in the great ill-looking changeling from her own. To ſupply this voracious creature, the credulous nurſe toils with unuſual labour, no way ſenſible that ſhe is feeding up an enemy to her race, and one of the moſt deſtructive robbers of her future progeny.

It was once doubted, whether theſe birds were carnivorous; but Reaumur was at the pains of breeding up ſeveral, and found that they would not feed upon bread or corn; but fleſh and inſects were their favourite nouriſhment. Their gluttony is not to be wondered at, when we conſider the capacity of their ſtomach, which is enormous, and reaches from the breaſt-bone to the vent.

The cuckoo when fledged and fitted for flight, follows its ſuppoſed parent but for a little time; its appetites for inſect food encreaſing, as it finds no great chance for a ſupply in imitating its little inſtructor, it parts good friends, the ſtep-child ſeldom offering any violence to its nurſe. Nevertheleſs, all the little birds of the grove ſeem to conſider the young cuckoo as an enemy, and revenge the cauſe of their kind by their repeated inſults. They purſue it wherever it flies, and oblige it to take ſhelter in the thickeſt branches of ſome neighbouring tree. All the ſmaller birds form the train of its purſuers; but the wry-neck, in particular, is found the moſt active in the chaſe; and thence it has been called by many the cuckoo's attendant and provider. But it is very far from following with a friendly intention: it only purſues as an inſulter, or a ſpy, to warn all its little companions of the cuckoo's depredations.

Such are the manners of this bird while it continues to reſide, or to be ſeen amongſt us. But early, at the approach of winter, it totally diſappears, and its paſſage can be traced to no other country. Some ſuppoſe that it lies hid in hollow trees; and others that it paſſes into warmer climates. Which of theſe opinions is true is very uncertain, as there are no facts related on either ſide that can be totally relied on. To ſupport the opinion that they remain torpid during the winter, at home, Willoughby introduces the following ſtory, which he delivers upon the credit of another. "The ſervants of

“ a gentleman, in the country, having ſtocked up, in
“ one of their meadows, ſome old dry rotten willows,
“ thought proper, on a certain occaſion, to carry them
“ home. In heating a ſtove, two logs of this timber
“ were put into the furnace beneath, and fire applied as
“ uſual. But ſoon, to the great ſurprize of the family,
“ was heard the voice of a cuckoo, ſinging three times
“ from under the ſtove. Wondering at ſo extraordinary
“ a cry in winter time, the ſervants ran and drew the
“ willow logs from the furnace, and in the midſt, one of
“ them ſaw ſomething move: wherefore, taking an ax,
“ they opened the hole, and thruſting in their hands,
“ firſt they plucked out nothing but feathers; afterwards
“ they got hold of a living animal; and this was the
“ cuckoo that had waked ſo very opportunely for its own
“ ſafety. It was, indeed,” continues our hiſtorian,
“ briſk and lively, but wholly naked and bare of fea-
“ thers, and without any winter proviſion in its hole.
“ This cuckoo the boys kept two years afterwards alive
“ in the ſtove; but whether it repaid them with a ſe-
“ cond ſong, the author of the tale has not thought fit to
“ inform us.”

The moſt probable opinion on this ſubject is, that as quails and woodcocks ſhift their habitations in winter, ſo alſo does the cuckoo; but to what country it retires, or whether it has been ever ſeen on its journey, are queſtions that we are wholly incapable of reſolving.

Of this bird there are many kinds in various parts of the world, not only differing in their colours but their ſize. Latham makes not leſs than forty ſpecies. There is a *large ſpotted cuckoo*, in the ſouth of Spain; and at the Cape of Good Hope there is a black creſted ſpecies. Only the common and ſpotted cuckoo have been ſeen in Europe.

THE WOODPECKERS.] Theſe birds live chiefly upon the inſects contained in the body of trees; and for this purpoſe are furniſhed with a ſtraight, hard, ſtrong, angular and ſharp bill, made for piercing and boring. They have a tongue of a very great length; round, ending in a ſharp, ſtiff, bony thorn, dentated on each ſide, to ſtrike ants and inſects when diſlodged from their cells. Their legs are ſhort and ſtrong, for the purpoſes of climbing. Their toes ſtand two forward, and two backward; which is particularly ſerviceable in holding by branches of trees. They have hard ſtiff tails, to lean upon when climbing. They feed only upon inſects, and want that inteſtine, which anatomiſts call the cœcum; a circumſtance peculiar to this tribe only.

Of this bird there are more than fifty ſpecies with many varieties. They form large colonies in the foreſts of every part of the world. They are found from the ſize of a jackdaw to that of a wren, and differ greatly in colour, and appearance; and agreeing only in the marks above-mentioned, or in thoſe habits which reſult from ſo peculiar a conformation. There are about five ſpecies known in Europe, or at leaſt in England, viz. the large *Black Woodpecker*, which is ſeventeen inches long, and is found in Germany; the *Green*, and three ſpecies of ſpotted. The Green *Wood-ſpite* or *Wood-pecker* is called the Rain Fowl in ſome parts of the country; becauſe, when it makes a greater noiſe than ordinary, it is ſuppoſed to foretell rain. It is about the ſize of a jay, and weighs ſix ounces; the throat, breaſt and belly are of a pale greeniſh colour; and the back, neck and covert feathers of the wings are full green. The *Great ſpotted-Wood-pecker*, weighs about three ounces, and is the ſize of a blackbird, and nine inches in length. The crown of the head is black, with a bar of crimſon on the hind part of it. On each ſide of the neck is a ſpot of white, the ſcapulars alſo and wing coverts are white. The back and wings are black, and the breaſt is a yellowiſh grey. The *Middle ſpotted Wood-pecker* nearly reſembles the preceding, but is ſmaller; and the *Leſſer ſpotted Wood-pecker* is ſcarcely an ounce in weight, and has all the upper parts of the body mottled with white. All theſe ſpecies feed upon inſects, and particularly on thoſe which are found in decaying trees.

The wood-pecker, however, does not confine its depredations ſolely to trees, but ſometimes lights upon the ground, to try its fortune at an ant-hill. It firſt goes to their hills, which it pecks, in order to call them abroad; it then thruſts out its long red tongue, which being like a worm, and reſembling their uſual prey, the ants come out to ſettle upon in great numbers; however, the bird watching the propereſt opportunity, withdraws its tongue at a jerk, and devours the devourers. This ſtratagem it continues till it has alarmed their fears; or till it is quite ſatisfied.

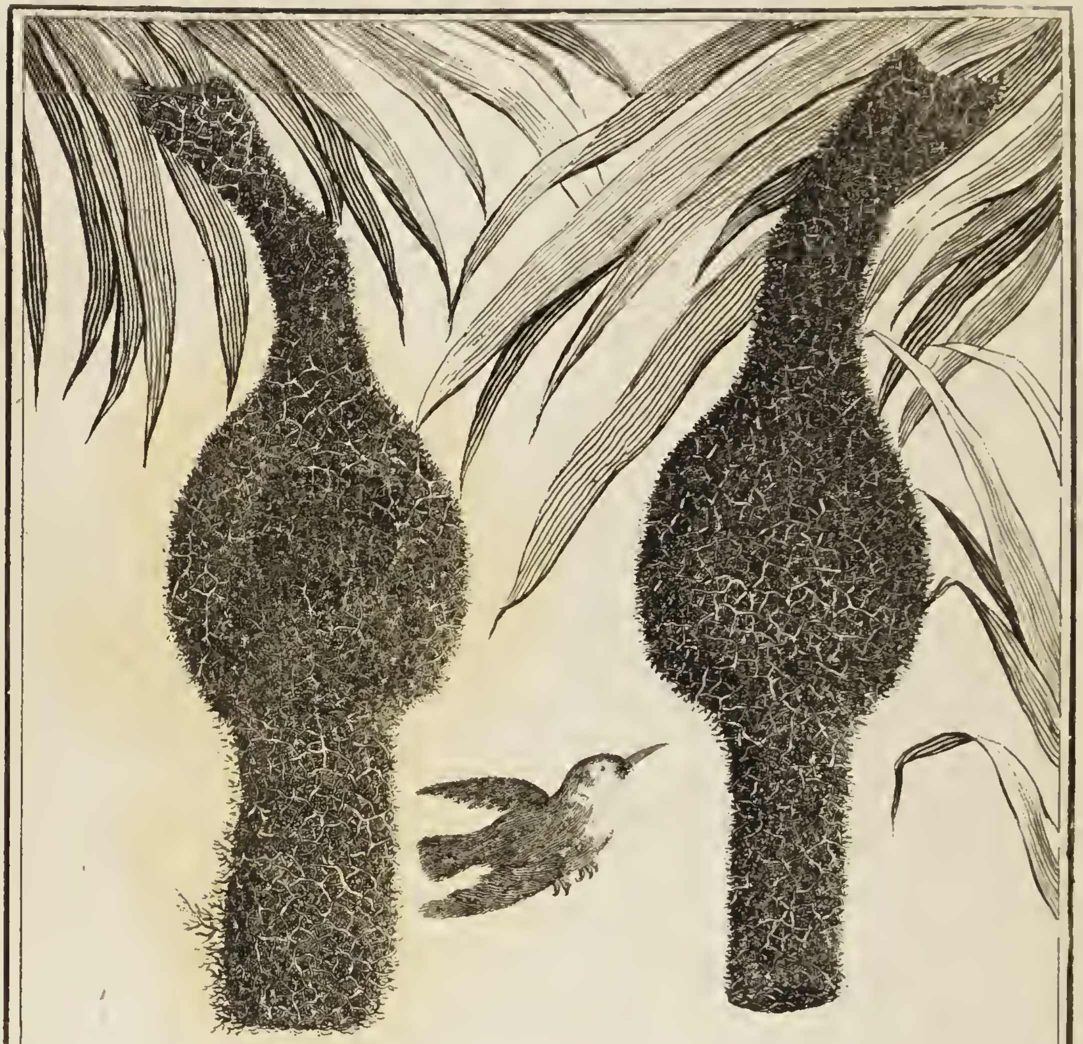
As the wood-pecker is obliged to make holes in trees to procure food, ſo is it alſo to make cavities ſtill larger to form its neſt and to lay in. This is performed, as uſual, with the bill; although ſome have affirmed that the animal uſes its tongue, as a gimblet, to bore with. But this is a miſtake; and thoſe that are curious, may often hear the noiſe of the bill making its way in large woods and foreſts. The wood-pecker chooſes, however, for this purpoſe, trees that are decayed, or wood that is ſoft, like beech, elm and poplar. In theſe, with very little trouble, it can make holes as exactly round as a mathematician could with compaſſes. One of theſe holes the bird generally chuſes for its own uſe, to neſtle, and bring up its young in: but as they are eaſily made, it is delicate in its choice, and often makes twenty before one is found fit to give entire ſatisfaction.

The wood-pecker takes no care to line its neſt with feathers or ſtraw; its eggs are depoſited in the hole, without any thing to keep them warm, except the heat of the parent's body. Their number is generally five or ſix; always white, oblong, and of a middle ſize. When the young are excluded, and before they leave the neſt, they are adorned with a ſcarlet plumage under the throat, which adds to their beauty.

The foreign birds of this genus are too numerous to ſpecify. Let us therefore inſtead of entering into the minuteneſs of deſcription, ſelect one as a ſpecimen. The *Buff creſted Wood-pecker* of Surinam, (See pl. LIII.) is in length twelve inches and a half. The whole head is creſted, the fore part of which is black, the hinder part buff-coloured. The general colour of the plumage is brown black, but the ſides of the neck and the breaſt are white ſtreaked with black. The *Minute Wood-pecker* which inhabits Cayenne is only three inches and a half in length, or about the ſize of a wren.

Of the Oriole, there appears to be only one ſpecies known in Europe; this is by ſome termed the *Golden Oriole* (See pl. LV.) It is the ſize of a thruſh, and has been called the golden thruſh and the witwal. The head and whole body of the male is of a rich yellow; the bill red; from that to the eye a black line: the wings black, marked with a bar of yellow, as are the ends of the feathers. The tail is black with the end yellow. The body of the female is a dull green, with duſky wings and tail. The neſt of this bird is of the ſhape of a purſe, and reſts upon the outermoſt

Plate.54.



Tropical Birds *of the Oriole Species, and their manner of building their Nests. p.71.*

twigs of tall trees. It is common in France, but has very rarely viſited England.

America however is the country in which theſe birds are found in the greateſt variety and the moſt perfect beauty. There are in fact upwards of forty ſpecies, moſt of which are natives of the new Continent. In Guiana and Braſil, the birds of this ſpecies take a different method to protect and hatch their naſcent progeny. A traveller who walks into the foreſts of thoſe countries, among the firſt ſtrange objects that excite curioſity, is ſtruck with the multitude of birds neſts hanging at the extremity of almoſt every branch (See pl. LIV. Many other birds build in this manner; but the chief of them are of the Oriole kind. In cultivated countries, a great part of the caution of the feathered tribe is to hide or defend their neſts from the invaſions of man, as he is their moſt dreaded enemy. But in the depth of thoſe remote and ſolitary foreſts, where man is but ſeldom ſeen, if the monkey or the ſnake can be guarded againſt, the bird has no other enemies to fear. On the bananas and plantanes of theſe regions, is ſeen the moſt various, and the moſt inimical aſſemblage of creatures that can be imagined. The top is inhabited by monkeys of ſome particular tribe, that drive off all others; lower down about the great trunk numbers of the larger ſnakes are found patiently waiting till ſome unwary animal comes within the ſphere of their activity; and at the edges of the tree hang theſe artificial neſts, in great abundance, inhabited by birds of the moſt delightful plumege.

The neſt is uſually formed in this manner: when the time of incubation approaches, they fly buſily about, in queſt of a kind of moſs, called, by the Engliſh inhabitants of thoſe countries, *old man's beard.* It is a fibrous ſubſtance, and not very unlike hair, which bears being moulded into any form, and ſuffers being glued together. This therefore, the little artiſt firſt glues by ſome viſcous ſubſtance, gathered in the foreſt, or ſews with the leaves of the banana to the extremeſt branch of a tree; then building downward, and ſtill adding freſh materials to thoſe already procured, a neſt is formed, that depends, like a pouch, from the point of the branch: the hole to enter at, is on the ſide; and all the interior parts are lined with the finer fibres of the ſame ſubſtance, which compoſe the whole.

Such is the general contrivance of theſe hanging neſts; which are made, by ſome other birds, with ſtill ſuperior art. A little bird of the Grosbeak kind, in the Philippine iſlands, makes its neſt in ſuch a manner, that there is no opening but from the bottom. At the bottom the bird enters, and goes up through a funnel, like a chimney, till it comes to the real door of the neſt, which lies on one ſide, and only opens into this funnel.

THE NUTHATCH weighs near an ounce, and is five inches and three quarters in length. The bill is ſtrong and ſtrait, and three quarters of an inch long. The upper part of the plumage is of a fine bluiſh grey, a black ſtroke runs from the mouth to the eye. The cheeks are white and the breaſt and belly of a dull orange colour. This bird runs up and down the bodies of trees like the wood-pecker. It feeds on inſects and nuts, which it ſtores in the hollow parts of the tree. It is a pretty ſight, ſays Willoughby, to ſee her fetch a nut out of her hoard, place it in a chink, and then ſtanding above it, ſtriking it with all its force till it breaks the ſhell and catches up the kernel. Dr. Plot ſays, that this bird by putting its bill into the crack of a tree can produce a violent ſound, as if it was rending aſunder, which may be heard at leaſt one hundred and twenty yards.

In ſome countries this bird, from the noiſe which it produces in the manner above ſtated, is called the Loggerhead. There are about ſix foreign ſpecies.

THE BEE-EATER is well known on the continent of Europe, though it has never been ſeen in England. It is about ten inches in length. The forehead is of a blue green, the top of the head, and upper part of the back cheſnut; the back and ſcapulars pale yellow tinged with cheſnut and green; the throat is yellow, and the under parts of the body blue green. Flocks of theſe birds are ſeen in Germany. It feeds chiefly upon inſects, and is good food. There are about twenty different ſpecies foreign and domeſtick. In plate LIII. the reader will find the *Indian Bee-eater*, which is an elegant bird, and will ſerve to give an idea of the genus.

THE WRYNECK, (See pl. LV.) is a beautiful bird, though its colours are of the plaineſt kind. It is about the ſize of a lark. Its plumage in general is aſh coloured, beautifully marked with black, ut the breaſt and belly are lighter than the upper pats. Its bill is three

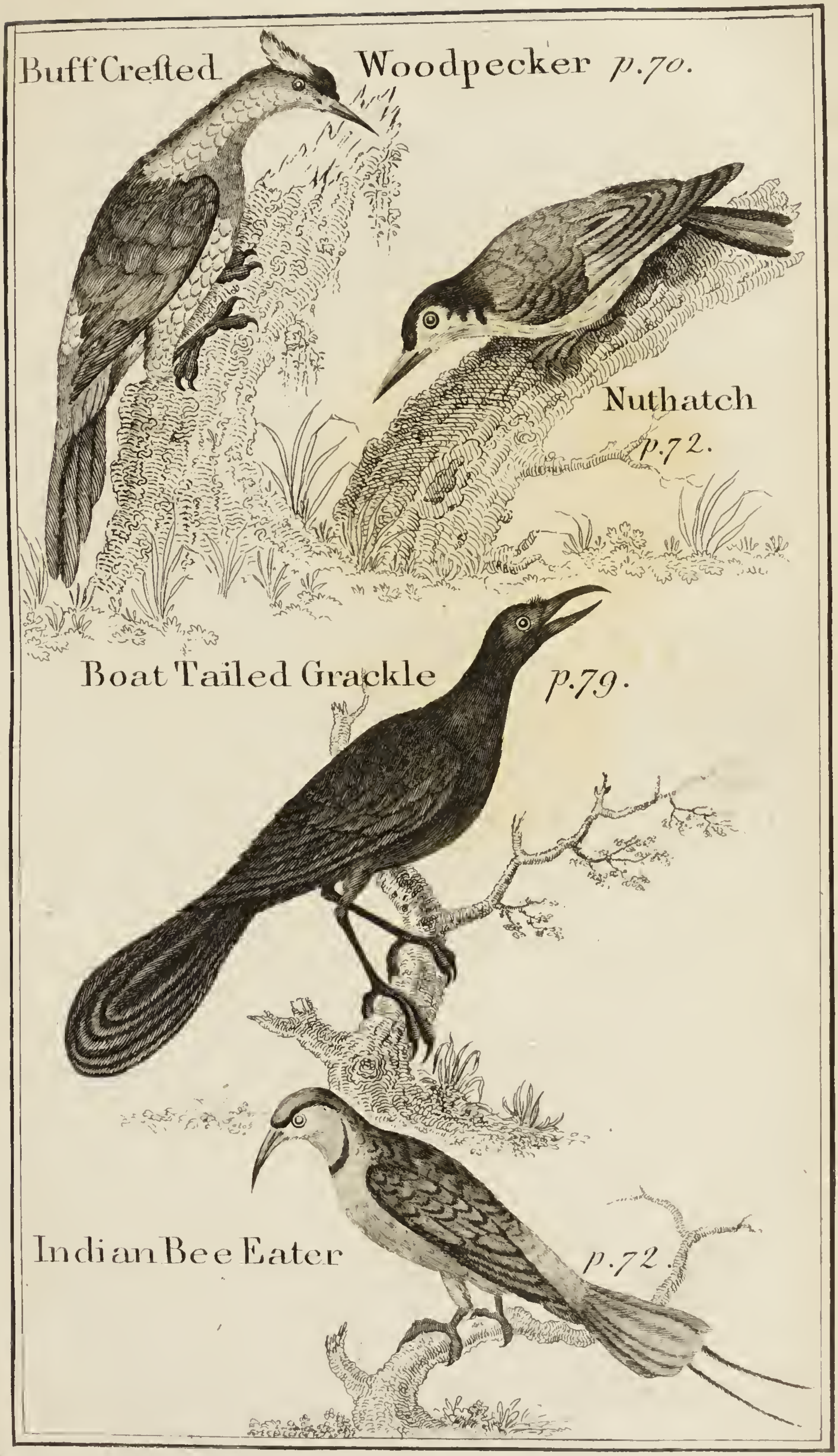
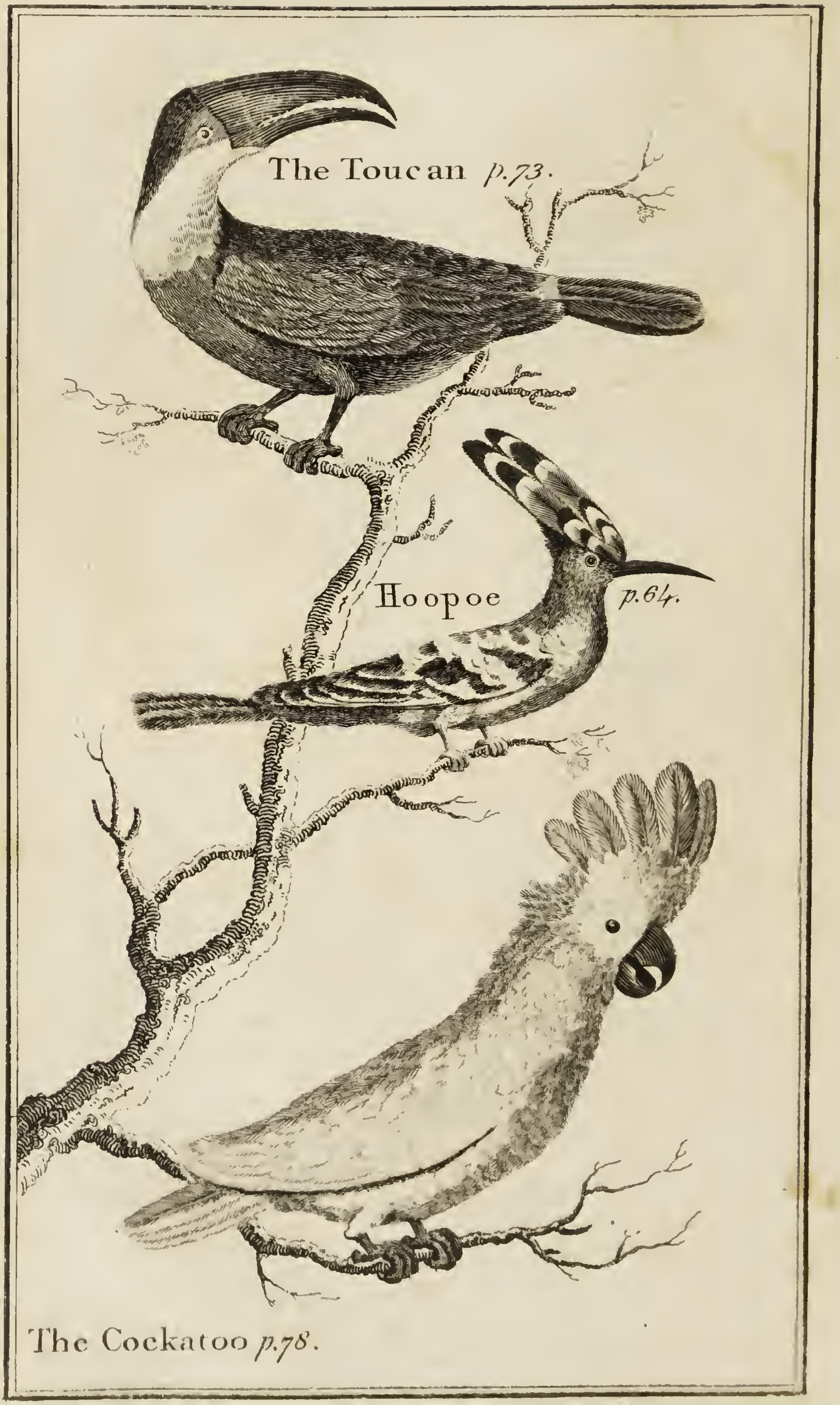

Buff Creſted Woodpecker p.70.
Nuthatch p.72.
Boat Tailed Grackle p.79.
Indian Bee Eater p.72.

Plate. 52.


The Toucan p. 73.
Hoopoe p. 64.
The Cockatoo p. 78.

three quarters of an inch long, and the tongue is like a worm when extended. With this inſtrument it procures its food, which conſiſts chiefly of ants. In England it is a bird of paſſage; at the end of ſummer it grows remarkably fat, and is on that account confounded with the Ortolan, and greatly celebrated among the connoiſſeurs in good eating. The young ones hiſs in the neſt like ſo many ſnakes, inſomuch that the ruſtics are ſometimes prevented plundering the neſt, being apprehenſive that they are approaching the brood of that reptile.

The Creeper is the ſmalleſt of European birds, if we except the creſted wren, and weighs only five drams. The bill is hooked like a ſickle. The upper part of the body is variegated with brown and black, and the breaſt and belly are of a ſilver white. This bird is very common in England, though, from its extreme agility in eluding the eye of the ſpectator, it is leſs frequently ſeen than other common birds. It feeds upon inſects, and builds in the holes of trees.

About fifty ſpecies foreign and domeſtick have been enumerated of this bird. In plate LVI. is repreſented the *Hook-billed Creeper*. The colour of this bird is in general olive green. It inhabits the Sandwich iſlands, and is one of the birds whoſe plumage the natives make uſe of for their feathered garments.

In this order is included a numerous liſt from all the tropical foreſts of the eaſt and weſt; that however which ſeems next to challenge our attention is the TOUCAN, a bird of the pie kind, whoſe bill is nearly as large as the reſt of its whole body; and the tongue of which is feathered at the edges.

Of this extraordinary bird there are about fifteen ſpecies. We ſhall only deſcribe the red-beaked toucan. (See pl. LII.) It is about the ſize of, and ſhaped like a jack-daw, with a large head to ſupport its monſtrous bill: this bill, from the angles of the mouth to its point, is ſix inches and an half; and its breadth, in the thickeſt part is a little more than two. Its thickneſs near the head, is one inch and a quarter; and it is a little rounded along the top of the upper chap, the under ſide being rounded alſo; the whole of the bill extremely ſlight, and a little thicker than parchment. The upper chap is of a bright yellow, except on each ſide, which is of a fine ſcarlet colour; as is alſo the lower chap, except at the baſe, which is purple. Between the head and the bill there is a black line of ſeparation all round the baſe of the bill; in the upper part of which the noſtrils are placed, and are almoſt covered with feathers; which has occaſioned ſome writers to ſay, that the toucan has no noſtrils. Round the eyes, on each ſide of the head, is a ſpace of bluiſh ſkin, void of feathers, above which the head is black, except a white ſpot on each ſide joining to the baſe of the upper chap. The hinder part of the neck, the back, wings, tail, belly, and thighs, are black. The under ſide of the head, throat, and the beginning of the breaſt, are white. Between the white on the breaſt, and the black on the belly, is a ſpace of red feathers, in the form of a new moon, with its horns upwards. The legs, feet and claws, are of an aſh-colour; and the toes ſtand like thoſe of parrots, two before, and two behind.

It is reported, by travellers, that this bird, though furniſhed with ſo formidable a beak, is harmleſs and gentle, being ſo eaſily made tame, as to ſit and hatch its young in houſes. It feeds chiefly upon pepper, which it devours very greedily, gorging itſelf in ſuch a manner, that it voids it crude and unconcocted. This, however, is no objection to the natives from uſing it again; they even prefer it before that pepper which is freſh gathered from the tree: and ſeem perſuaded that the ſtrength and heat of the pepper is qualified by the bird, and that all its noxious qualities are thus exhauſted.

This bird is only found in the warm climates of South America, where it is in great requeſt, both for the delicacy of its fleſh, which is tender and nouriſhing; and for the beauty of its plumage, particularly the feathers of the breaſt. The ſkin of this part the Indians pluck off, and when dry, glue to their cheeks; and this they conſider as an irreſiſtible addition to their beauty. The MOTMOT is a bird almoſt exactly reſembling the toucan, and conſidered by ſome as of the ſame genus.

The HORNBILL.] Nearly allied to the Toucan is the Hornbill, by ſome called the *calao* or *Indian Raven.* It indeed ſeems to hold the ſame place in the warm climates of the old continent as the Toucan does in the new. The diſtinguiſhing characteriſtic of this genus is an immenſe bending bill with frequently a large protuberance in the upper part of it reſembling an additional bill.

The *Rhinoceros Hornbill*, or *Rhinoceros* bird, is nearly as large as a Turkey; the bill is ten inches long, and two and a half think at the baſe. On the upper part is an appendage as large as the bill itſelf, and turning upwards, which meaſures eight inches in height. There is nothing elſe remarkable in the bird, as the general colour of the plumage is black. This bird is found in moſt parts of the Eaſt Indies, where (like the Raven) it feeds upon carrion.

The *Helmet Hornbill* is remarkable for having the ſame prominence of a conical form; and in the *Philippine* iſles there is a ſpecies the horn of which reaches backwards beyond the eyes, ending in two angular points, which produce the effect of a bird with two horns.

In pl. LX. we have given a repreſentation of the *Pied Hornbill*, or calao of Malabar; the circumſtance which diſtinguiſhes it from the reſt of its kind, is that the breaſt, belly, and part of the wings are white, the remainder of the body is, like the reſt of theſe animals, black.

There are about twelve ſpecies of this bird in all, one of which is white.

The PARROT is the beſt known among us of all foreign birds, as it unites the greateſt beauty with the greateſt docility.

The eaſe with which this bird is taught to ſpeak, and the great number of words which it is capable of repeating, are equally ſurpriſing. We are aſſured, by a grave writer, that one of theſe was taught to repeat a whole ſonnet from Petrarch; and " that I may not be wanting in my inſtance, ſays a late writer, I have ſeen a parrot, belonging to a diſtiller, who had ſuffered pretty largely in his circumſtances from an informer who lived oppoſite him, very ridiculouſly employed. This bird was taught to pronounce the ninth commandment, *Thou ſhalt not bear falſe witneſs againſt thy neighbour*, with a very clear, loud, articulate voice. The bird was generally placed in its cage over againſt the informer's houſe, and delighted the whole neighbourhood with its perſevering exhortations."

Willoughby tells a ſtory of a parrot, which is not ſo dull as thoſe uſually brought up when this bird's facility of talking happens to be the ſubject. " A parrot belong-
" ing to king Henry the Seventh, who then reſided at
" Weſtminſter, in his palace by the river Thames, had
" learned to talk many words from the paſſengers as they

" happened

“ happened to take water. One day, ſporting on its
“ perch, the poor bird fell into the water, at the ſame
“ time crying out, as loud as he could, *A boat, twenty*
“ *pound for a boat.* A waterman, who happened to be
“ near, hearing the cry, made to the place where the
“ parrot was floating, and taking him up, reſtored him to
“ the king. As it ſeems the bird was a favourite, the
“ man inſiſted that he ought to have a reward rather equal
“ to his ſervices than his trouble; and, as the parrot had
“ cried twenty pounds, he ſaid the king was bound in
“ honour to grant it. The king at laſt agreed to leave it
“ to the parrot's own determination, which the bird
“ hearing, cried out, *Give the knave a groat.*”

Thoſe who uſually bring theſe birds over are content to make three or four diſtinctions. The large kind, which are of the ſize of a raven, and are called Maccaws; the next ſize are ſimply called Parrots; thoſe which are entirely white are called Lories; and the leſſer ſize of all are called Parakeets. The difference between even theſe is rather in the ſize than in any other peculiar conformation, as they are all formed alike, having toes two before and two behind for climbing and holding; ſtrong hooked bills for breaking open nuts, and other hard ſubſtances, on which they feed; and loud harſh voices, by which they fill their native woods with clamour.

The bill is faſhioned with peculiarities; for the upper chap, as well as the lower, are both moveable. In moſt other birds the upper chap is connected, and makes but one piece with the ſkull; but in theſe, and in one or two ſpecies of the feathered tribe more, the upper chap is connected to the bone of the head by a ſtrong membrane, placed on each ſide, that lifts and depreſſes it at pleaſure. By this contrivance they can open their bills the wider; which is not a little uſeful, as the upper chap is ſo hooked and ſo over-hanging, that, if the lower chap only had motion, they could ſcarcely gape ſufficiently to take any thing in for their nouriſhment.

The tongue of this bird ſomewhat reſembles that of a man; for which reaſon, ſome pretend that it is ſo well qualified to imitate the human ſpeech; but the organs by which theſe ſounds are articulated lie farther down in the throat, being performed by the great motion which the os hyoides has in theſe birds above others.

The parrot, though common enough in Europe, will not, however, breed here. The climate is too cold for its warm conſtitution; and though it bears our winter when arrived at maturity, yet it always ſeems ſenſible of its rigour, and loſes both its ſpirit and appetite during the colder part of the ſeaſon.

This ſagacity, which parrots ſhew in a domeſtic ſtate, ſeems alſo natural to them in their native reſidence among the woods. They live together in flocks, and mutually aſſiſt each other againſt other animals, either by their courage or their notes of warning. They generally breed in hollow trees, where they make a round hole, and do not line their neſt within. If they find any part of a tree beginning to rot from the breaking off of a branch, or any ſuch accident, this they take care to ſcoop, and to make the hole ſufficiently wide and convenient; but it ſometimes happens that they are content with the hole which a wood-pecker has wrought out with greater eaſe before them; and in this they prepare to hatch and bring up their young.

They lay two or three eggs; and probably the ſmaller kind may lay more; for it is a rule that univerſally holds through nature, that the ſmalleſt animals are always the moſt prolific.

It is not for the ſake of their converſation alone that the parrot is ſought after among the ſavages; for, though ſome of them are but tough and ill-taſted, yet there are other ſorts, particularly of the ſmall parakeet tribe, that are very delicate food. The ſeed of the cotton-tree intoxicates them in the ſame manner as wine does man; and even wine itſelf is drunk by parrots, by which they are thus rendered more talkative and amuſing. But of all food, they are fondeſt of the carthamus, or baſtard ſaffron; which, though ſtrongly purgative to man, agrees perfectly with their conſtitution, and fattens them in a very ſhort time.

Latham enumerates near a hundred and fifty different ſpecies of this bird. The Maccaw is the largeſt ſpecies, ſome being as large as a capon; the common parrot holds the middle rank, and the Lory and the Parakeets are the ſmalleſt, ſome of them not exceeding the ſize of a common ſparrow. The parakeet tribe in Braſil are moſt beautiful in their plumage, and the moſt talkative birds in nature. They are very tame, and appear fond of mankind; they ſeem pleaſed with holding parley with him; and while he continues to talk, anſwer him, and appear reſolved to have the laſt word. The fowler walks into the woods, where they keep in abundance; but as they are green, and exactly the colour of the leaves among which they ſit, he only hears their prattle, without being able to ſee a ſingle bird; he looks round him, ſenſible that his game is within gun-ſhot in abundance, but is mortified to the laſt degree that it is impoſſible to ſee them. Unfortunately for theſe, however, as ſoon as they have ſtripped the tree on which they ſate of all its berries, ſome one of them flies off to another; and, if that be found fit for the purpoſe, it gives a loud call, which all the reſt reſort to. That is the opportunity the fowler has long been waiting for, he fires in among the flock while they are yet on the wing; and he ſeldom fails of bringing down a part of them. But it is ſingular enough to ſee them when they find their companions fallen. They ſet up a loud outcry, as if they were chiding their deſtroyer, and do not ceaſe till they ſee him preparing for a ſecond charge.

Of the *Cockatoo*, or creſted parrot [See pl. LII.] there are ſeveral ſpecies, but they chiefly differ it their plumage. The moſt common is the white or rather cream coloured, ſome however are black, and ſome of the white kind have a ſcarlet creſt: This ſpecies is called the crowned cockatoo.

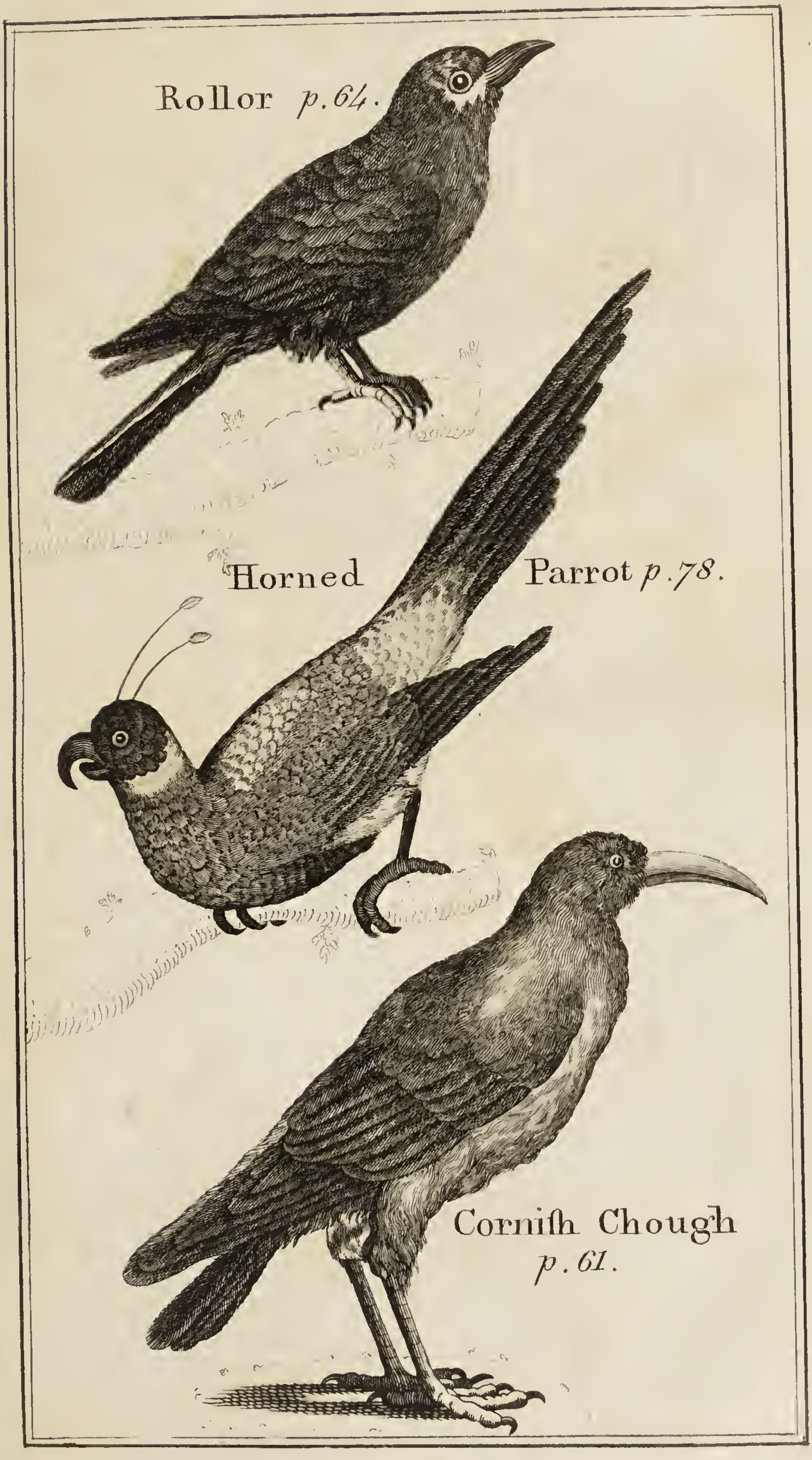
In pl. LI. is an engraving of the *Horned Parrot*, a bird of ſingular beauty and elegance. It is about the ſize of a ſmall dove. The bill is blueiſh at the baſe, and black at the tip. The ſides of the head are orange. From the crown ſpring two ſlender duſky feathers, about an inch and a half long and tipped with crimſon. The hind part of the neck and rump are yellow, the reſt of the body is green, except the ends of the wings and the tail, which are blue. It is an inhabitant of New Caledonia.

Of the ANI there are about three ſpecies. Their bill reſembles in a great meaſure that of the parrot. The *greater Ani* is the ſize of a jay, the *leſſer* about the ſize of a blackbird. The general colour of their plumage is black. They are gregarious birds, inhabiting the Weſt India iſlands, and may be made to talk like parrots.

The WATTLE BIRD is a native of New Zealand. It is about the ſize of a jay, of an aſh colour, and is peculiarly diſtinguiſhed by the wattles which grow under the bill like thoſe of a cock. The fleſh is eatable.

Of the GRACKLE there are about eleven ſpecies inhabiting America and the tropical climates, ſome of them the

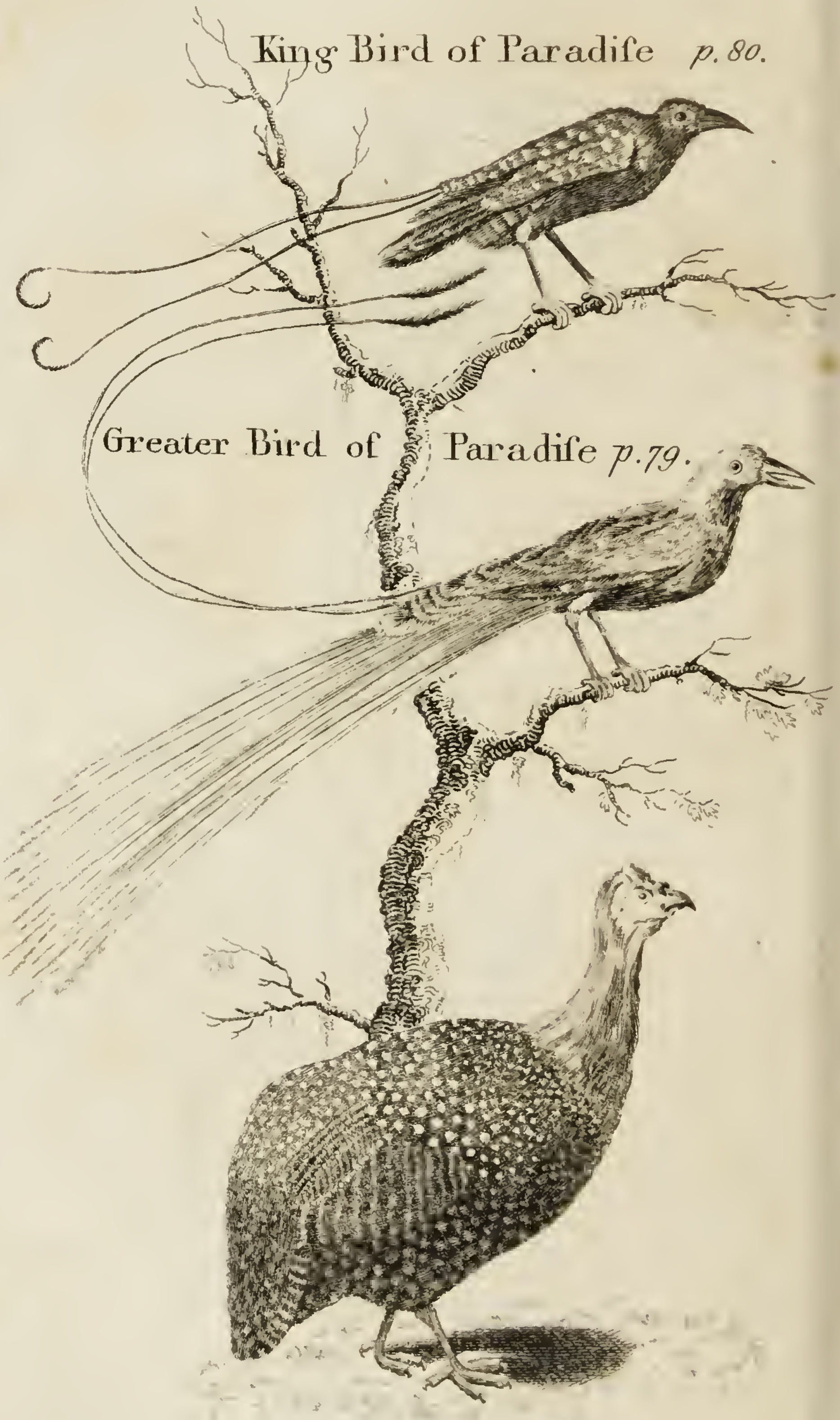
Plate. 51.



Rollor *p. 64.*

Horned Parrot *p. 78.*

Cornish Chough *p. 61.*



King Bird of Paradiſe *p. 80.*

Greater Bird of Paradiſe *p. 79.*

The Guinea Fowl *p. 45.*

ſize of a magpie, others about that of a blackbird. Their general plumage is black. They live on maize, fruits and inſects; but one ſpecies in the Philippine iſlands, which is called from its reſemblance to the next genus, and from its beauty, the *Paradiſe Grackle*, is remarkable for its being an extraordinary deſtroyer of graſshoppers. The inhabitants of the Iſle of Bourbon, being greatly infeſted with that inſect, imported a pair of theſe birds, which preſently relieved them from that peſt. In proceſs of time however the grackles became very numerous, and the inhabitants thinking them injurious, proſcribed them by an edict, on which the graſshoppers increaſed ſo faſt upon them, that they were obliged to ſend for more, which preſently diſpatched every graſshopper in the iſland.

That which is repreſented in pl. LIII. is the *boat tailed* Grackle from Jamaica. Its plumage is black, but it is remarkable for the feathers of its tail forming a hollow like a boat on the upper ſurface, ſo that it may be compared to a hen's tail with the underſide turned uppermoſt. It is the ſize of a cuckow.

The Bird of Paradise.] This bird has been more celebrated for the falſe and imaginary qualities which are attributed to it, than for its real, and truly remarkable properties. It has been reported of it, that it is naturally without legs, and is perpetually on the wing, even while it ſleeps, and that it ſubſiſts entirely upon vapours and dew, with a variety of other aſſertions, equally falſe and equally ridiculous. There are about eight different ſpecies of theſe birds, but that which is beſt known is the *greater Paradiſe Bird*, (See pl. XLIX.) which appears to the eye of the ſize nearly of a pigeon, though in reality the body is not much larger than that of a thruſh. The tail, which is about ſix inches, is as long as the body; the wings are large compared with the bird's other dimenſions. The head, the throat and the neck are of a pale gold colour. The baſe of the bill is ſurrounded by black feathers, as alſo the ſide of the head and throat, as ſoft as velvet, and changeable like thoſe on the neck of a mallard. The hinder part of the head is of a ſhining green, mixed with gold. The body and wings are chiefly covered with beautiful brown, purple and gold feathers. The uppermoſt part of the tail feathers are of a pale yellow, and thoſe under them white and longer than the former; for which reaſon the hinder part of the tail appears to be all white.

But what chiefly excites curioſity are, two long naked feathers, which ſpring from the upper part of the rump above the tail, and which are uſually about two feet long. Theſe are bearded only at the beginning and the end; the whole ſhaft for above one foot nine inches being of a deep black, while the feathered extremity is of a changeable colour, like the mallard's neck.

This bird, is a native of the Molucca Iſlands, but found in greateſt numbers in that of Aro. The inhabitants are not inſenſible of the pleaſure they afford, and give them the name of God's birds, as being ſuperior to all others that he has made. They live in large flocks, and at night generally perch upon the ſame tree. They are called by ſome, the Swallows of Ternate, from their rapid flight, and from their being continually on the wing in purſuit of inſects, their uſual prey.

As the country where they are bred has its tempeſtuous ſeaſon, when rains and thunders continually diſturb the atmoſphere, theſe birds are then but ſeldom ſeen. The natives, who make a trade of killing and ſelling theſe birds to the Europeans, generally conceal themſelves in the trees where they reſort, and having covered themſelves up from ſight in a bower made of the branches, they ſhoot at the birds with reedy arrows; and, as they aſſert, if they happen to kill the king, they then have a good chance for killing the greateſt part of the flock. The chief mark by which they know the king is by the ends of the feathers in his tail, which have eyes like thoſe of a Peacock. When they have taken a number of theſe birds, their uſual method is to gut them and cut off their legs; * they then run a hot iron into the body, which dries up the internal moiſture; and filling the cavity with ſalts and ſpices, they ſell them to the Europeans for a perfect trifle.

The *King bird* of *Paradiſe*, (See pl. XLIX.) is about the ſize of a lark. The upper parts of the plumage are of a bright red, and the breaſt is a blood red colour with a broad green bar. The wing feathers are a little mottled with white and green, and the whole plumage has a fine gloſs like ſattin. The tail is remarkably ſhort, and from it ſpring two naked feathers like thoſe in the former ſpecies,

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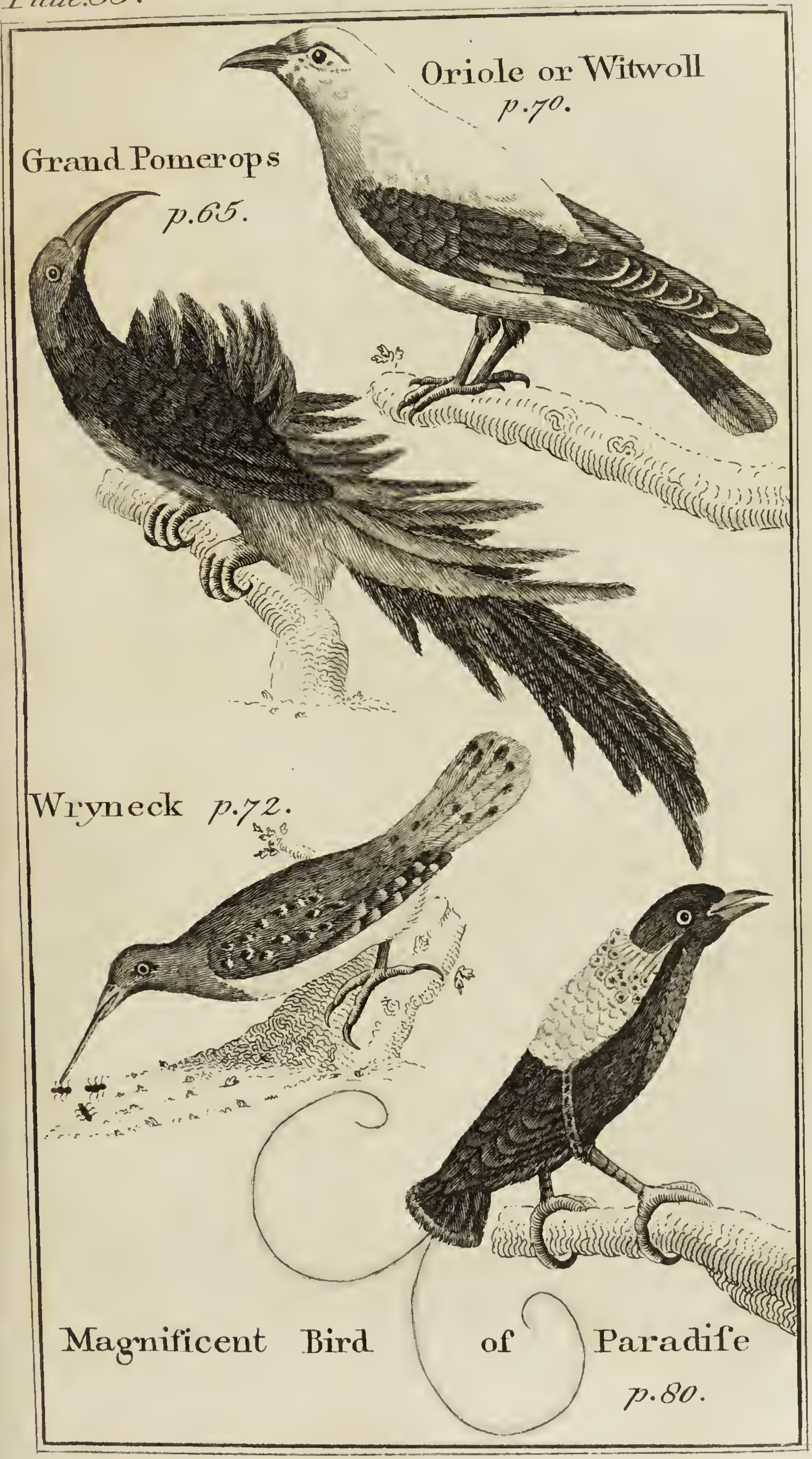
* This has given riſe to the ridiculous fable above quoted; and the reaſon of this operation is that they are uſed in that country as aigrettes, and for other ornaments of dreſs; and that being the caſe, it is uſual to cut off the uſeleſs and leſs brilliant parts.

Plate.55.


Oriole or Witwoll
p.70.
Grand Pomerops
p.65.
Wryneck p.72.
Magnificent Bird of Paradiſe
p.80.

except that they coil in a ſpiral manner at the end. It is ſuppoſed to breed in New Guinea, where there is alſo a ſpecies the predominant colour of which is black.

The *magnificent bird of Paradiſe*, (See pl. LV.) is ſuperior to all the preceding in the beauty of its plumage. It is the ſize of a blackbird. The crown of the head is a deep cheſnut. At the back part of the neck a tuft of yellowiſh feathers ariſes, each of which is marked near the tip with a black ſpot; beneath theſe ſprings another tuft ſtill larger and of a ſtraw colour. The back and tail are of a bright red brown. Down the middle of the throat, neck and breaſt, the colour is blue green, which is encircled by a gorget (as it were) of black with a green ſhade. The long feathers from the tail are without tufts at the end, but are furniſhed with very ſhort green webs on one ſide. Beſides theſe there is the *gorget bird* of *Paradiſe*, and ſome other ſpecies of leſs note.

The BEEF EATER is about eight inches and a half long. The upper parts of its plumage is light brown, and its breaſt a dirty yellow. It has a ſtrong and thick bill, with which it picks the worms and other inſects which are encloſed under the ſkin on the backs of the oxen, whence it derives its name. It is a native of Senegal.

Of the CURUCUI there are about ſeven ſpecies moſt of them inhabitants of South America. They are beautiful birds, the plumage of ſome of them being aſh coloured, and of others reddiſh, finely varied with white, &c. The *Red bellied Curucui* is of a green colour on the back, wings, &c. and the lower parts of a fine red. The whole genus is diſtinguiſhed by having the noſtrils covered with thick briſtles. They are moſtly of the ſize of a blackbird.

The BARBETS are deſcribed as a dull ſtupid race of birds, inhabiting the tropical climates. They probably take their name from the ſtrong briſtles which ſurround the bill. They are in general larger than a lark, and vary greatly in plumage, being black, green, reddiſh, pied, &c.

The JACAMAR is a beautiful bird. The general colour of its plumage is green, and in its habits and form it bears a conſiderable reſemblance to the kingfiſher. There are three or four ſpecies of this bird, all of them inhabitants of South America.

The Tody is a ſmall bird which bears conſiderable relation to the fly-catchers. Latham reckons about fourteen ſpecies, all inhabiting the warmer climate of America. They are green, aſh coloured, blue, brown and pied, and ſeldom are found to exceed the ſize of a wren.

The Humming-bird.] Of this charming little animal, there are not leſs than ſixty ſpecies, from the ſize of a ſmall wren, down to that of a bee. An European could never have ſuppoſed a bird exiſting ſo very ſmall, and yet completely furniſhed out with a bill, feathers, wings, and inteſtines, exactly reſembling thoſe of the largeſt kind. A bird not ſo big as the end of one's little finger, would probably be ſuppoſed but a creature of imagination, were it not ſeen in infinite numbers, and as frequent as butterflies in a ſummer's day, ſporting in the fields of America, from flower to flower, and extracting their ſweets with its little bill.

The ſmalleſt humming-bird is about the ſize of a bee, and weighs no more than twenty grains. The feathers on its wings and tail are violet brown, but thoſe on its body, and under its wings, are of a greeniſh brown; with a fine red caſt or gloſs, which no ſilk or velvet can imitate. The bill is black, ſtraight, ſlender, and of the length of three lines and a half. The *Ruby creſted Humming-bird* is larger than the preceding. Its throat is like burniſhed gold gloſſed with emeralds; and it has a ſmall creſt on its head, green at the bottom, and as it were gilded at the top; and which ſparkles in the ſun like a little ſtar in the middle of its forehead.

The *Garnet throated Humming bird*, (See pl. LX.) is four inches and a quarter long. It has a hooked bill about an inch long, the head neck, back, &c. dark green, and the throat a fine garnet appearing gloſſy in ſome directions. The *gold throated Humming Bird* is about half as big as the common wren, and without a creſt on its head; but, to make amends, it is covered, from the throat half way down the belly, with changeable crimſon-coloured feathers, which in different lights, change to a variety of beautiful colours, much like an opal. The *Ruby-necked* is however the moſt beautiful of all the ſpecies. It is about the ſize of the preceding. The upper parts of the body are brown with a mixture of green gold, and the throat like the fineſt topaz. There are, in a word, of almoſt all colours of theſe beautiful animals, crimſon, green, emerald, white breaſted, and ſpotted. Some of them with, and ſome without creſts. The eyes of moſt of them are very ſmall and as black as jet.

It is inconceivable how much theſe add to the high finiſhing and beauty of a rich luxurious weſtern landſcape. As ſoon as the ſun is riſen, the humming-birds, of different kinds, are ſeen fluttering about the flowers, without ever lighting upon them. Their wings are in ſuch rapid motion, that it is impoſſible to diſcern their colours, except by their glittering. They are never ſtill, but continually in motion, viſiting flower after flower, and extracting its honey. For this purpoſe they are furniſhed with a forked tongue, that enters the cup of the flower, and extracts its nectared tribute. Upon this alone they ſubſiſt. The rapid motion of their wings brings out an humming ſound, whence they have their name.

The neſts of theſe birds are not leſs curious than the reſt: they are ſuſpended in the air, at the point of the twigs of an orange, a pomegranate, or a citron tree; ſometimes even in houſes, if they find a ſmall and convenient twig for the purpoſe. The female is the architect, while the male goes in queſt of materials; ſuch as cotton, fine moſs, and the fibres of vegetables. The neſt is about the ſize of an hen's egg cut in two. They lay two eggs at a time, and never more, about the ſize of ſmall peas, and as white as ſnow, with here and there a yellow ſpeck. The time of incubation continues twelve days; at the end of which the young ones appear, and are much about the ſize of a blue-bottle-fly.

It is a doubt whether or not theſe birds have a continued note in ſinging. All travellers agree that, beſide the humming noiſe produced by their wings, they have a little interrupted chirrup; but Labat aſſerts, that they have a moſt pleaſing melancholy melody in their voices, though ſmall and proportioned to the organs which produce it. It is very probable that, in different places, their notes are alſo different; and as there are ſome that continue torpid all the winter, there may likewiſe be ſome with agreeable voices, though the reſt may in general be ſilent.

CHAP. XXVI.

Of Birds of the Paſſerine or Sparrow Order—The STARE—*The* THRUSH—*The Miſſel Thruſh—The Throſtle—The Redwing—The Fieldfare—The Blackbird—The Ring Ouzle—The Water Ouzle—The Roſe-coloured Ouzle—The Blue and Solitary Thruſhes—The Mock-bird—The White-tailed Thruſh—The* CHATTERER—*The Bohemian and Caruncu-lated Chatterer—The* GROSBEAK—*The Hawfinch—The Pine Groſbeak—The Croſsbill—The Bulfinch—The Greenfinch—The Java Sparrow—The* BUNTING—*The Yellowhammer—The Reed Sparrow—The Tawny Bunting—The Ortolan—The Black-throated Bunting—The* FINCHES—*The Sparrow—The Goldfinch—The Linnet—The Twite—The* FLYCATCHER—*The Fantailed Flycatcher—The* LARK *Genus—The* WAGTAIL—*The White, Yellow, and Grey Wagtail—The* WARBLERS—*The Nightingale—The Redbreaſt—The Redſtart—The Black-cap—The Wren—The Canary Bird—The Hedge Sparrow—The Wheat-eater—The Whinchat—The Stone-chatter—The White-throat—The Thorn-tailed Warbler—The* TITMOUSE—*The Swallow—The Swift—The Martin—The* GOATSUCKER—*The* COLY—*The* TANAGER—*The* MANAKIN.

The Paſſerine, or Sparrow Order.

THE STARE OR STARLING.] THERE are few birds better known in theſe temperate climates than that under our conſideration. It has a nearer relation with the blackbird than with any other; but it is diſtinguiſhable from that genus by the gloſſy green of its feathers, in ſome lights, and the purple in others. It breeds in hollow trees, the eaves of houſes, towers, ruins, cliffs, and often in high rocks over the ſea. It lays four or five eggs of a pale greeniſh aſh-colour, and makes its neſt of ſtraw, ſmall fibres of roots, &c. Its voice is rough; but what it wants in the melody of its note, it compenſates by the facility with which it is taught to ſpeak. In winter theſe birds aſſemble in vaſt flocks, and feed upon worms and inſects. At the approach of ſpring, they aſſemble in fields, as if in conſultation together, and for three or four days ſeem to take no nouriſhment: the greater part leave the country; the reſt breed here, and bring up their young.

Of the ſtare there are about thirteen ſpecies foreign and domeſtic. There have been found varieties of the *common ſtare*, white, black, and pied. At New Zealand is a ſpecies diſtinguiſhed by wattles, like thoſe of a cock: at the Cape of Good Hope they are found with combs; and in China there is a ſpecies of a beautiful green.

Of the THRUSH there are not leſs than one hundred and thirty ſpecies, foreign and domeſtic.

The *Miſſel-thruſh* is diſtinguiſhed from all of the kind by its ſuperior ſize, being much larger than any of them, viz. eleven inches in length, and weighing near five ounces. It differs ſcarcely in any other reſpect from the throſtle, except that the ſpots on the breaſt are larger. It builds its neſt in buſhes, or on the ſide of ſome tree, as all of this kind are found to do, and lays four or five eggs in a ſeaſon. Its ſong, which it begins in ſpring, ſitting on the ſummit of a high tree, is, not, however, ſo fine, as that of the throſtle. It is the largeſt bird of all the feathered tribe that has muſic in its voice; the note of all greater birds being either ſcreaming, chattering, or croaking. It feeds on inſects, holly and miſletoe-berries; and ſometimes ſends forth a very diſagreeable ſcream when frighted or diſturbed. It is very common in England.

The *Throſtle* is only nine inches in length. It differs from the miſſel-thruſh chiefly in the marks on its breaſt, which in the former are of an irregular ſhape; but in the throſtle are like the heads of arrows with the points upwards. Varieties of this bird have been found wholly white.

The *Red-wing* is eaſily diſtinguiſhed from the two former ſpecies by having a white ſtreak over the eye, and the under parts of the wings reddiſh. The *field-fare* is known by his yellowiſh bill, by the dark colour of his legs, and by his head being aſh-colour ſpotted with black. The field-fare and red-wing make but a ſhort ſtay in this country. With us they are inſipid, tuneleſs birds, flying in flocks, and exceſſively watchful to preſerve the general ſafety. All their ſeaſon of muſic and pleaſure is employed in the more northern climates, where they ſing moſt delightfully, perched among the foreſts of maples, with which thoſe countries abound. They build their neſts in hedges; and lay ſix bluiſh green eggs ſpotted with black.

The *Black bird* or *Ouzel* is about the ſize of ten inches. The female is generally brown; and varieties are found of them both white and pied, particularly in cold countries. It plaſters its neſt, which is commonly in the ſtump of a hawthorn, in the inſide with clay, and lays about four or five bluiſh eggs.

The *Ring Ouzel* in ſize rather exceeds the black-bird. It appears of a dull black, and on the breaſt is a patch of white paſſing a little backwards like a collar. They generally build near ſtreams, and are birds of paſſage in all the ſouthern parts of Europe.

Nearly allied to this laſt is the *Water Ouzel.* It is rather leſs than a black-bird. The upper parts of the body have more of a browniſh caſt than in the former bird. It does not go in flocks like the ring ouzel, but lives chiefly in the neighbourhood of ſtreams, and particularly ſuch as take their courſe among rocks. It dives after ſmall fiſhes, and even runs after them at the bottom of the ſtream as on land.

The *Roſe-coloured Ouzel*, (See pl. LVIII.) is the ſize of the ſtarling. The feathers of its head are long, and form a creſt. The upper parts of the body are black, with gloſſes of blue, purple, and green; the lower parts of the body are of a pale roſe-colour. This bird is common in many parts of Europe and Aſia, but is very ſcarce in England.

The *Blue* and *Solitary Thruſhes* form two ſpecies nearly reſembling in habits and in manners. Their plumage is in general blue, though the latter has a caſt of brown. It is not uncommon in France and Italy, where it chuſes the moſt frightful precipices for its reſidence, whence it probably receives its name. As it is rarely caught, it is in high eſtimation even in the countries where it breeds, but ſtill more valuable when carried from home. It not only whiſtles in the moſt delightful manner, but ſpeaks with an articulate diſtinct voice. It is ſo docile, and obſerves all things with ſuch diligence, that, though waked at midnight by any of the family, it will ſpeak and whiſtle at the word of command.

To this tribe might be added an immenſe liſt of foreign birds of the thruſh kind, and living like them upon fruit and berries. Words could not afford variety enough to deſcribe all the beautiful tints that adorn ſome of them. The brilliant green of the emerald, the flaming red of the ruby, the purple of the amethyſt, or the bright blue of the ſapphire, could not by the moſt artful combination ſhew any thing ſo truly lively or delightful to the ſight as the feathers of the chilcoqui or the tautotol. Paſſing, therefore, over theſe beautiful, but little known, birds, we ſhall only mention the American *Mimic-thruſh*, or *Mock-bird*. It is but a plain bird to the eye, about the ſize of a thruſh, of a uniform grey colour, and a reddiſh bill. It is poſſeſſed not only of its own natural notes, which are muſical and ſolemn, but it can aſſume the tone of every other animal in the wood, from the wolf to the raven. It ſeems even to ſport itſelf in leading them aſtray. It will at one time allure the leſſer birds with the call of their males, and then terrify them when they have come near with the ſcreams of the eagle. The mock-bird, however, pleaſes moſt when it is moſt itſelf. At thoſe times it uſually frequents the houſes of the American planters; and, ſitting all night on the chimney-top, pours forth the ſweeteſt and the moſt various notes of any bird whatever. It would ſeem, if accounts be true, that the deficiency of moſt other ſong-birds in that country is made up by this bird alone. They often build their neſts in the fruit-trees about houſes, and are eaſily rendered domeſtic.

In plate LVII. the reader will find an engraving of a *White-tailed Thruſh* from Gibraltar; but we do not find that it is poſſeſſed of any other remarkable quality.

The CHATTERERS form a very beautiful race of birds, including about ten ſpecies. That which is called the *Waxen* or *Bohemian Chatterer*, (See pl. LVI.) is the ſize of a large lark, eight inches. Its head is adorned with a beautiful pointed creſt. The upper parts of the body are of a reddiſh aſh-colour; the breaſt and belly of a pale, purpliſh cheſnut; a black ſtreak paſſes over each eye; the chin alſo and quills are black. Their native country is Bohemia, whence they wander in flocks all over Europe, and were formerly ſuperſtitiouſly conſidered as a preſage of a peſtilence. They are ſeldom ſeen in the ſouth parts of Britain.

The *Caruncluated Chatterer* (See plate LVII.) is a native of Cayenne and Braſil. It is about twelve inches long. The plumage of the male is of a pure white, except a tinge of yellow on the rump, quills, and tail. The female has the upper parts of the plumage olive-grey, and the lower parts grey, edged with olive. Both have a fleſhy caruncle at the baſe of the bill, which projects over it like that of a turkey-cock. Their voice is (like that of all the kind)

kind) noiſy and garrulous, and ſo loud, that it may be heard at the diſtance of half a league.

The Grosbeaks form a very extenſive genus of birds, including nearly 100 ſpecies, of which, however, not more than five are common in Europe, viz. the hawfinch, the pine-groſbeak, the croſsbill, the bullfinch, and the green groſbeak, or greenfinch. Their common character is a ſhort, thick bill, and a tongue as if cut off at the end.

The firſt of theſe, the *Hawfinch*, viſits England at uncertain times. It is in length ſix inches and three quarters. The chin is black; the neck aſh-colour, the body brown, with the greater quill-feathers black, and the under-parts of the body of a dirty fleſh-colour.

The *Pine Groſbeak* is twice the ſize of the bulfinch. The head, neck, breaſt, and rump are crimſon; the back and wing-coverts black. It frequents the pine-foreſts in all the northern parts of Europe.

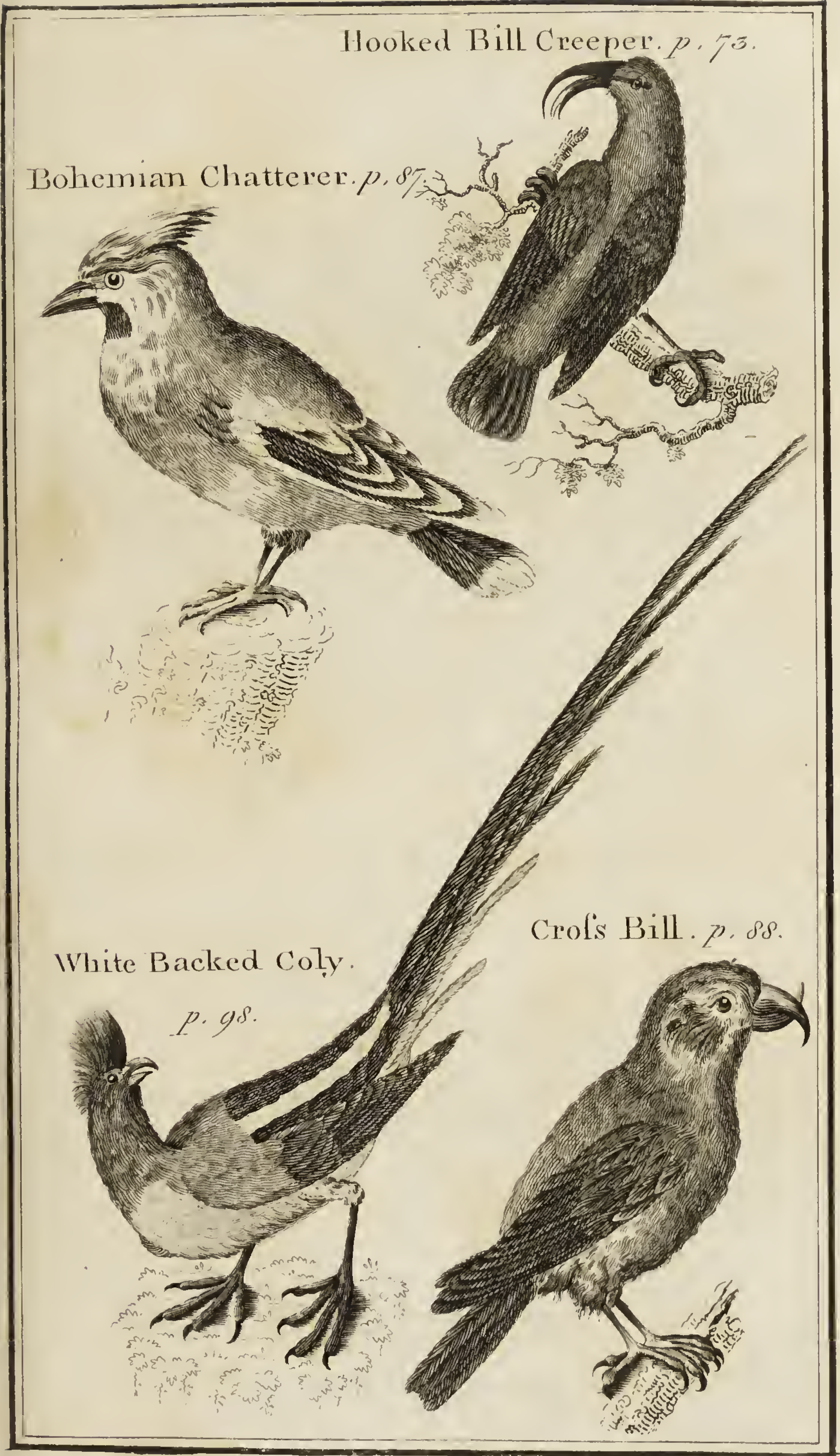
The *Croſs-bill* (See pl. LVI.) is too curious a bird to be overlooked. It is common in all the northern kingdoms of Europe, and ſometimes viſits England. Beſides the ſingularity of its bill, it is remarked for varying its colours. The males, which are red, alter ſometimes to orange; the females, which are green, to different ſhades of the ſame colour. It is about the ſize of a lark, and feeds on the cones of pines, and pippins of fruit. They are ſaid to divide an apple with one ſtroke of the bill to get at the contents.

The *Bulfinch* is too well known to need a deſcription. It is chiefly remarkable for its capability of being taught to ſing and whiſtle different tunes. Some varieties have been found black, and ſome perfectly white.

The *Greenfinch* is alſo well known, being about the ſize and ſhape of the bulfinch, and of a yellowiſh-green. This bird is ſo eaſily tamed, that it will eat out of the hand five minutes after it is taken. To produce this effect, no more is neceſſary than to take it into the dark and put it on your finger, to which the bird will cautiouſly adhere; as it does not know whither to fly, you may then introduce the finger of the other hand under its breaſt, upon which it will climb, and, not finding any diſpoſition to hurt it, will preſently become tame and familiar.

Among the foreign birds of this genus is that beautiful little animal, ſo well known for its red bill and elegant plumage,

Plate. 56.



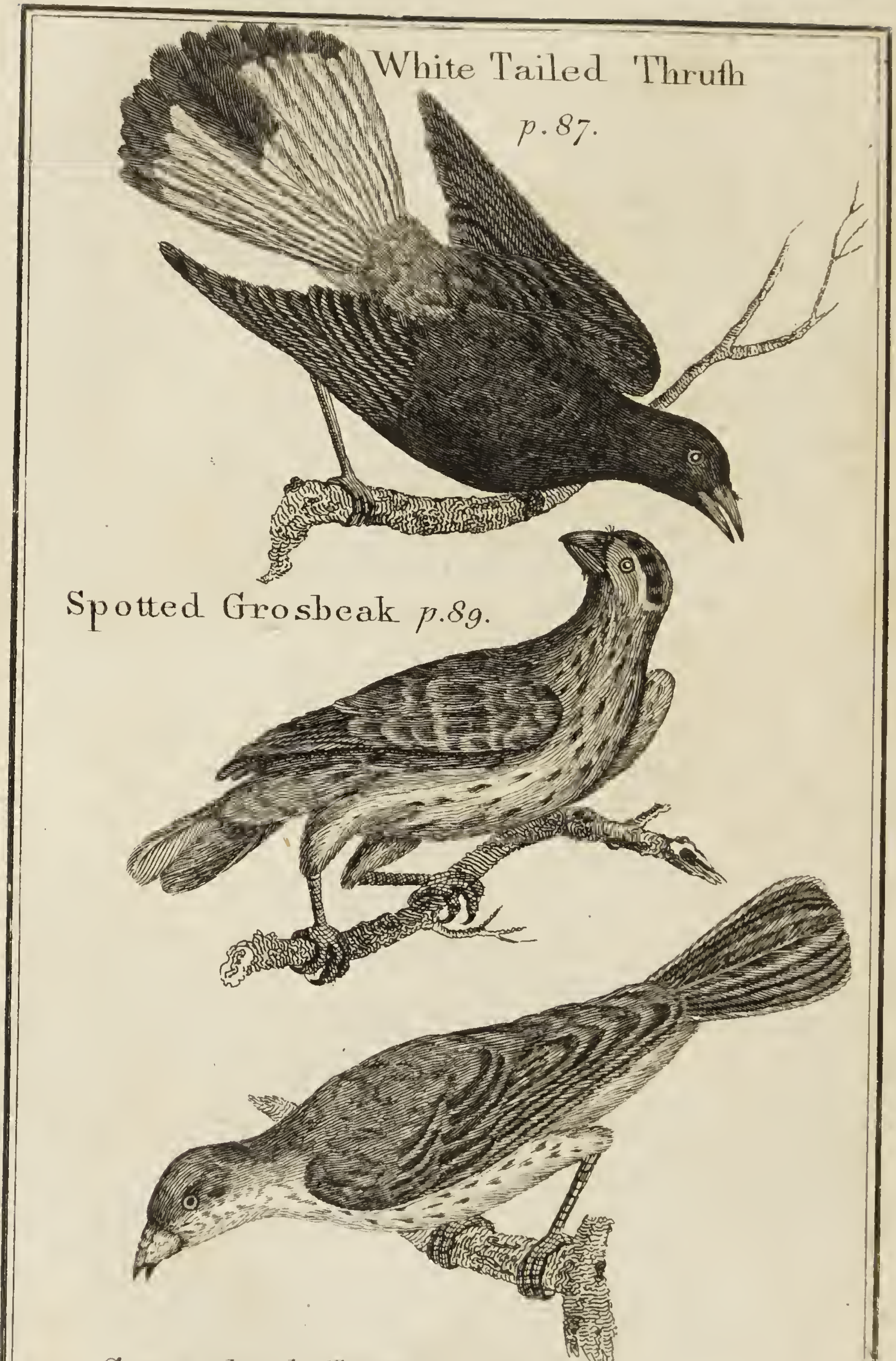
Hooked Bill Creeper. *p. 73.*

Bohemian Chatterer. *p. 87.*

White Backed Coly. *p. 98.*

Croſs Bill. *p. 88.*

Plate.57.


White Tailed Thruſh
p.87.
Spotted Grosbeak *p.89.*
Carunculated Chatterer *p.87.*

plumage, which generally goes under the name of the *Java Sparrow*. The *ſpotted Groſbeak*, which is repreſented in pl. LVII. is a native of New England.

The Bunting genus are diſtinguiſhed by a ſtrong conic bill, and in the roof of the upper mandible a hard knob to break and grind ſeeds.

The firſt of this ſpecies which we ſhall mention, is a bird well known by the name of the *yellow-hammer*, and diſtinguiſhed by the crown of the head being generally of a beautiful pale yellow. It is a bird little eſteemed, as its voice is monotonous, and poſſeſſes but little melody.

The *Common Bunting* is the ſize of the former, but ſtouter in the body. It is of a pale olive-brown. They collect in flocks in the winter, and are often ſeen on the branch of ſome bare tree in immenſe numbers They are caught and ſold, from the ſimilarity of their plumage, for larks, and are called bunting-larks.

The *Reed Sparrow* inhabits marſhy places. In the male the head, chin and throat are black, with a white ring round its neck. The upper parts of the body are browniſh red, with a ſtreak of black, the lower parts white. In Lorrain, and ſome parts of Europe, they are birds of paſſage.

The *Tawny Bunting* is ſix inches 3-4ths long. The head and neck are tawny, the back black, the lower parts of the body are white, and the tail a little forked. It is not a common bird in England. The *Snow Bunting* has the forehead and crown white, with ſome mixture of black; the back, and middle feathers of the tail black; the rump, the outer feathers of the wings and tail white. They are called in Scotland *Snow-flakes*, from their appearance in ſnowy weather: the more northward they are found, the whiter the plumage. The *mountain-finch* is leſs common. The plumage in general, on the upper parts, is aſh-colour ſpotted with black; and the breaſt is waved with flame-colour.

But the moſt famous bird of all this genus is the *Ortolan*. It is ſomewhat leſs than the yellow-hammer. The plumage on the upper parts is browniſh cheſnut, mixed with black, the under parts are pale rufous. Theſe birds are common in France and Italy, but are not found in England. They are caught in numbers to fatten for the table. This is done by including them in a dark room, and feeding them with oats and millet. By this proceſs they become ſo fat, that they would die from that cauſe alone, were they not killed for ſale. In this ſtate they will ſometimes weigh three ounces, and are accounted the moſt luxurious repaſt of the epicure, being, as it were, one lump of exquiſite fat.

In plate LIX. is a print of the *Black-throated Bunting*, which is a native of America. It is in general brown, with a yellow breaſt, and a black ſpot under the throat. There are about ſixty-five ſpecies of the bunting, foreign and domeſtic.

The FINCH genus is diſtinguiſhed from the preceding by a bill perfectly conic. It includes more than one hundred ſpecies, one of which, the *Sparrow*, has given a name to this order of birds. Of the ſparrow there are two ſpecies, the *Tree* and the *Houſe-ſparrow*, the latter of which is the larger: they are both well-known birds.

The *Goldfinch* is the moſt beautiful bird which inhabits theſe regions, and is alſo one of the moſt docile and harmonious. The *Chaffinch* reſembles the bulfinch, but it is not ſo black on the head, nor ſo deep a red on the breaſt, and is conſpicuous for a broad bar of white on each wing; its ſong is agreeable in ſpring, but in ſummer it only chirps. The *Siſkin*, or *Aberdavine*, is a much leſs common bird, being in fact only a bird of paſſage in England. The bill is white, the top of the head black, the upper parts of the body yellowiſh-olive, and the under parts greyiſh-yellow. It is a ſong-bird, but of inferior note.

The *Linnet* is too well known to require a deſcription.

Of the *Red-pole*, or *Red-headed Linnet* there are two ſpecies, the greater and the leſs, but both are leſs than the common linnet. They are both diſtinguiſhed by a blood-coloured ſpot on the head, and by the breaſt being tinged with the ſame colour; the breaſt of the females is, however, yellow, whence it is a common fraud in the ſhops to paint their breaſts red, in order to paſs them off for males. The *Mountain Linnet*, or twit, includes alſo two varieties, the one the ſize of the common linnet, the other much ſmaller. The colour of the plumage is in general browniſh-red, like the common linnets, but the rump is crimſon, ſcarlet, or orange. They are common in England, and are eaſily tamed; but there is no harmony in their note.

This genus comprehends a great variety of foreign birds, eminent for their beautiful plumage, and ſome for the muſic of their ſong: among theſe, the beſt known to Europeans, is the *Canary-bird*, which, indeed, is now become

come ſo common, and has continued ſo long in a domeſtic ſtate, that its native habits, as well as its native country, ſeem almoſt forgotten. Though, by the name, it appears that theſe birds came originally from the Canary Iſlands, yet we have them only from Germany, where they are bred up in great numbers, and ſold into different parts of Europe.

In its native iſlands, a region equally noted for the beauty of its landſcapes and the harmony of its groves, the canary-bird is of a duſky grey colour, and ſo different from thoſe uſually ſeen in Europe, that ſome have even doubted whether it be of the ſame ſpecies. With us, they have that variety of colouring uſual in all domeſtic fowls; ſome white, ſome mottled, ſome beautifully ſhaded with green; but they are more eſteemed for their note than their beauty, having a high, piercing pipe, as indeed all thoſe of the finch tribe have, continuing for ſome time in one breath without intermiſſion, then raiſing it higher and higher by degrees, with great variety.

THE FLYCATCHERS are with us ſummer birds only, and take their name from feeding upon inſects. The *Spotted Flycatcher*, however, eats fruit, and is, on that account, called in Kent, the *cherry-ſucker*. It is, in general, of a mouſe-colour, the head ſpotted with black, and the wings and tail edged with white. The *pied flycatcher* is leſs than a hedge-ſparrow, and is known by a white ſpot on the forehead.

There are upwards of eighty foreign birds of this kind.

The *fantailed flycatcher*, (See pl. LVIII.) is a native of New Zealand. It is about the ſize of the bearded-titmouſe, may be eaſily tamed, and will ſit on any perſon's ſhoulder to pick off the flies. The whole head is black, with a white collar; the upper parts of the body olive-brown; the under parts yellowiſh nut-colour, and the tail white, except the two middle-feathers, which are black.

THE LARK genus includes about twenty-eight ſpecies, all of them diſtinguiſhed by the length of their heel. The *Great-creſted Lark*, the *Calandre Lark*, the *White-winged Lark*, the *Black Lark*, and ſome others, are found in different parts of Europe, but do not viſit Britain. The *Sky Lark*, which is the moſt common, the *Wood Lark*, the *Tit Lark*, the *Field Lark*, which is larger than the former, but leſs than the ſky lark; the *Red Lark*, and the *Small-creſted Lark*, which is, however, very uncommon, are all Britiſh birds. They are all ſong-birds; but their muſic in confinement is much inferior to what it is when poſſeſſed of their native liberty. The muſic, indeed, of every bird in captivity produces no very pleaſing ſenſations; it is but the mirth of a little animal inſenſible of its unfortunate ſituation; it is the landſcape, the grove, the golden break of day, the conteſt upon the hawthorn, the fluttering from branch to branch, the ſoaring in the air, and the anſwering of its young, that gives the bird's ſong its true reliſh. Theſe united, improve each other, and raiſe the mind to a ſtate of the higheſt, yet moſt harmleſs exultation.

The lark builds its neſt upon the ground, beneath ſome turf that ſerves to hide and ſhelter it. The female lays four or five eggs, of a duſky hue in colour, ſomewhat like thoſe of a plover. It is while ſhe is ſitting that the male uſually entertains her with his ſinging; and while he is riſen to an imperceptible height, yet he ſtill has his loved partner in his eye, nor onee loſes ſight of the neſt either while he aſcends or is deſcending. This harmony continues ſeveral months, beginning early in the ſpring on pairing. In winter, they aſſemble in flocks, when their ſong forſakes them, and the bird-catchers deſtroy them in great numbers for the tables of the luxurious.

Of the WAGTAIL there is about eleven ſpecies, with us only the *white*, (ſo called from having a greater proportion of white on the belly and tail than the others) the *yellow*, and *grey wagtail*, are common. The manners of theſe birds are well known.

The WARBLERS are a very numerous genus, including upwards of one hundred and fifty ſpecies, moſt of them (as the name may ſerve to intimate) diſtinguiſhed for the excellence of their muſic. Of theſe, the firſt rank is certainly due to

The Nightingale.] This moſt famous of the feathered tribe viſits England in the beginning of April, and leaves it in Auguſt. It is found but in ſome of the ſouthern parts of that country, being totally unknown in Scotland, Ireland, or North Wales. They frequent thick hedges and low coppices, and generally keep in the middle of the buſh, ſo that they are rarely ſeen. They begin their ſong in the evening, and generally continue it for the whole night. For weeks together, if undiſturbed, they ſit upon the ſame tree; and Shakeſpear rightly deſcribes the nightingale ſitting nightly in the ſame place.

In the beginning of May, the nightingale prepares to make its neſt, which is formed of the leaves of trees, ſtraw, and moſs. The neſt being very eagerly ſought after, is as cunningly ſecreted; ſo that but very few of them are found by the boys when they go upon theſe purſuits. It is built at the bottom of hedges, where the buſhes are thickeſt and beſt covered. While the female continues ſitting, the male at a good diſtance, but always within hearing, chears the patient hour with his voice, and, by the ſhort interruption of his ſong, often gives her warning of approaching danger. She lays four or five eggs; of which but a part, in our cold climate, come to maturity.

The delicacy, or rather the fame, of this bird's muſic, has induced many to abridge its liberty to ſecure its harmony. Its ſong, however, in captivity is not ſo very alluring; and the tyranny of taking it from thoſe hedges where only it is moſt pleaſing, ſtill more depreciates its impriſoned efforts. Geſner aſſures us, that it is not only the moſt agreeable ſongſter in a cage, but that it is poſſeſſed of a moſt admirable faculty of talking. He tells the following ſtory in proof of his aſſertion, which he ſays was communicated to him by a friend. "Whilſt I was at Ra-
"tiſbone," ſays his correſpondent, "I put up at an inn,
"the ſign of the Golden Crown, where my hoſt had three
"nightingales. It happened at that time, being the ſpring
"of the year, when thoſe birds are accuſtomed to ſing,
"that I was ſo afflicted with the ſtone, that I could ſleep
"but very little all night. It was uſual then about mid-
"night, to hear the two nightingales jangling, and talk-
"ing with each other, and plainly imitating men's diſ-
"courſes. Beſides repeating the daily diſcourſe of the
"gueſts, they chanted out two ſtories. One of their ſto-
"ries was concerning the tapſter and his wife, who refuſed
"to follow him to the wars as he deſired her; for the
"huſband endeavoured to perſuade his wife, as far as I
"underſtood by the birds, that he would leave his ſervice
"in that inn, and go to the wars in hopes of plunder. But
"ſhe refuſed to follow him, reſolving to ſtay either at
"Ratiſbone, or go to Nuremberg. There was a long and
"earneſt contention between them; and all this dialogue
"the birds repeated. They even repeated the unſeemly
"words which were caſt out between them, and which
"ought rather to have been ſuppreſſed and kept a ſecret.
"The other ſtory was concerning the war which the em-
"peror was then threatening againſt the proteſtants; which

“ the birds probably heard from ſome of the generals that
“ had conferences in the houſe. Theſe things did they
“ repeat in the night after twelve o'clock, when there was
“ a deep ſilence. But in the day time, for the moſt part,
“ they were ſilent, and ſeemed to do nothing but meditate
“ and revolve with themſelves upon what the gueſts
“ conferred together as they ſat at table, or in their walks.”

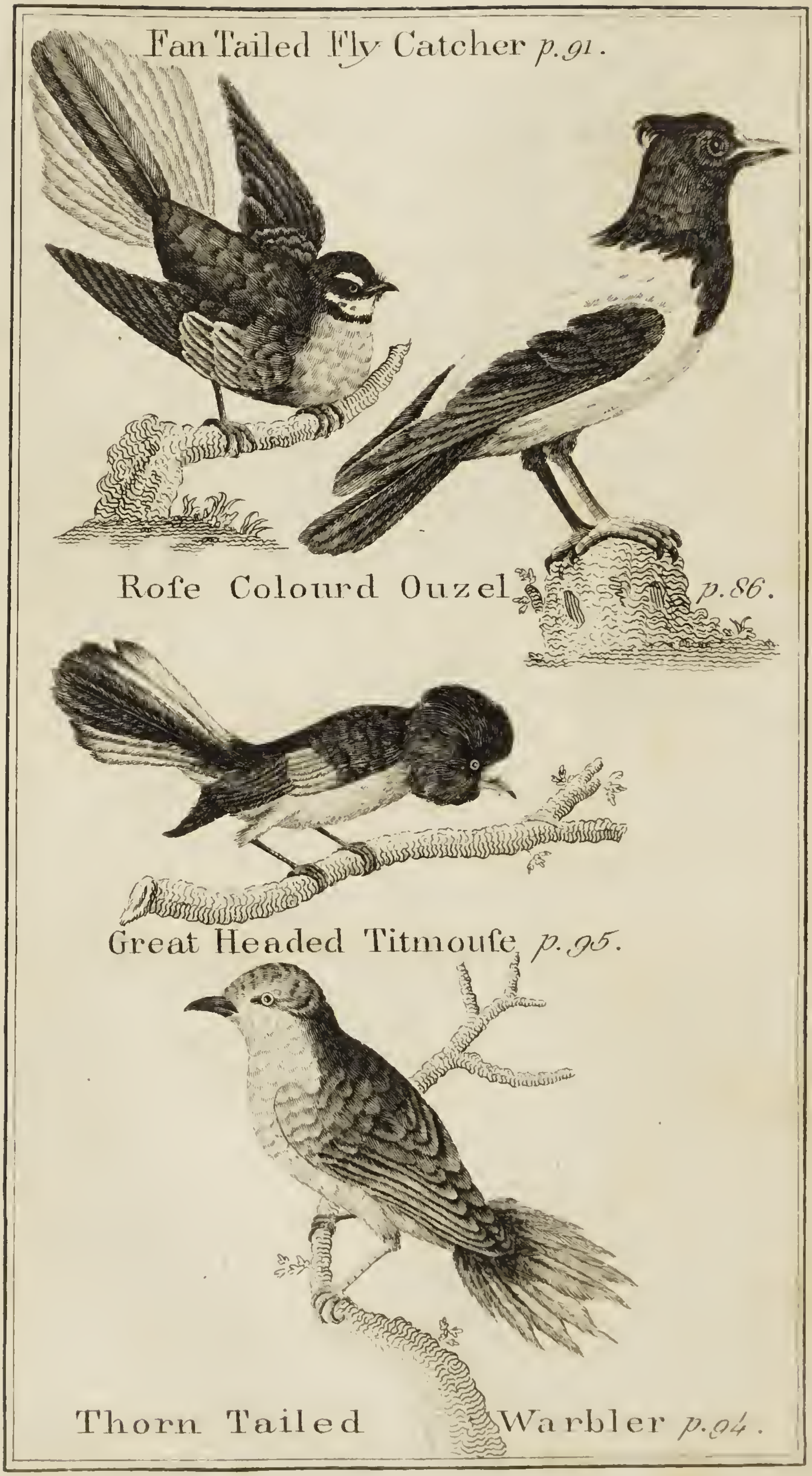
Such is the ſagacity aſcribed to the nightingale. But there is a little bird, rather celebrated for its affection to mankind than its ſinging, which, however, in our climate, has the ſweeteſt note of all others. The reader already perceives that we mean the *red-breaſt*, the well-known friend of man, that is found in every hedge, and makes it vocal. The note of other birds is louder, and their inflections more capricious; but this bird's voice is ſoft, tender, and well ſupported; and the more to be valued as we enjoy it the greateſt part of the winter. If the nightingale's ſong has been compared to the fiddle, the red-breaſt's voice has all the delicacy of the flute.

The *Red-ſtart* is a bird of paſſage, like the nightingale. Its forehead is white; the cheeks and throat black; the neck and back of a bluiſh grey; and the breaſt, &c. are red. It has a pleaſing note, but will not endure confinement.

The *Black-cap* and the *wren*, though ſo very diminutive, are yet prized by ſome for their ſinging. The former is called by ſome the mock nightingale; and the latter is admired for the loudneſs of its note, compared to the little body whence it iſſues.

The *Hedge-Sparrow* is a well-known bird, which has a ſweet and plaintive note, which it begins with the firſt froſty mornings, and continues for ſome time in the ſpring. The *Wheat-ear* is more celebrated for the delicacy of its fleſh, than for the excellence of its melody. The numbers enſnared in the neighbourhood of Eaſtbourn, are ſaid to amount annually to about 1840 dozen. The *Whin-chat*, the *Stone-chatter*, and the *White-throat*, are all common birds of this genus: but it would be an endleſs taſk to range with the minuteneſs of a nomenclator through all the varieties. Of the foreign birds the *Thorn-tailed Warbler*, which we have cauſed to be engraved in plate LVIII. is one of the moſt remarkable. It is a native of Terra del Fuego, is about the ſize of a ſparrow. The upper parts of the body are reddiſh-brown, mottled with yellow, and the breaſt and belly are white.

Plate 58.



Fan Tailed Fly Catcher *p. 91.*

Roſe Colourd Ouzel *p. 86.*

Great Headed Titmouſe *p. 95.*

Thorn Tailed Warbler *p. 94.*

Of the TITMOUSE there are about ſix ſpecies known in theſe climates, though there are not leſs than twenty-eight in all. The *great*, the blue, the *cole*, the *marſh*, the *long-tailed*, and the *bearded Titmouſe*, are all Britiſh birds. This laſt, which is about ſix inches long, is diſtinguiſhed by a tuft of black feathers under each eye, reſembling a muſtacho. It is common in the marſhes near London, and has erroneouſly been claſſed among the butcher birds.

Many of the foreign birds of this genus are curious. The *great headed titmouſe*, (See pl. LVIII.) is a native of New Zealand. It is four inches and a half long. All the upper parts of the body are black, except a ſpot of white on the head, wings and tail; the breaſt is orange.

THE SWALLOW kind comprehends about thirty-ſeven ſpecies. The *chimney ſwallow*, (See pl. LIX.) is the moſt common. The upper parts of its plumage are black, with a purpliſh gloſs; the forehead and chin red; and the breaſt and belly are white: the tail is very forked.

The *ſwift*, (See pl. LIX.) is the largeſt of the kind known in theſe climates, being near eight inches long, and the extent of its wings eighteen inches, though it ſcarcely weighs an ounce. The whole plumage is a ſooty black, except the chin, which is white. The legs are remarkably ſhort, and conſequently almoſt all its actions are performed on the wing. All its food is collected in this manner, conſiſting entirely of inſects; and even the materials of its neſt it collects either as they are carried about with the wind, or picks up from the ſurface in its ſweeping flight.

The *martin* is inferior in ſize to the *chimney ſwallow*, and its tail leſs forked. The head and upper parts of the body are of a gloſſy blue black; the breaſt and belly are white, as is alſo the rump, which may be conſidered as its diſtinctive character. It builds commonly under the eaves of houſes, and ſometimes againſt the ſides of high cliffs over the ſea.

The *ſand martin* is the leaſt of the ſwallow kind that viſits Great Britain. The upper parts of the body are mouſe coloured; the breaſt and belly are white, with a mouſe-coloured ring as a collar. To form its neſt it bores ſome feet deep into a high ſand bank, where it depoſits five or ſix white eggs. It has been ſaid that the young of this bird are very fat, and in flavour ſcarcely inferior to the Ortolan.

Theſe birds are all known by their very large mouths, which, when they fly are always kept open: they are not leſs remarkable for their ſhort ſlender feet, which ſcarcely are able to ſupport the weight of their bodies; their wings are of immoderate extent for their bulk; and their note is a ſlight twittering, which they ſeldom exert but upon the wing.

This peculiar conformation ſeems attended with a ſimilar peculiarity of manners. Their food is inſects, which they always purſue flying. For this reaſon, during fine weather, when the inſects are moſt likely to be abroad, the ſwallows are for ever upon the wing, and ſeen purſuing their prey with amazing ſwiftneſs and agility. All ſmaller animals, in ſome meaſure, find ſafety by winding and turning, when they endeavour to avoid the greater: the lark thus evades the purſuit of the hawk; and man the crocodile. In this manner, inſects upon the wing endeavour to avoid the ſwallow; but this bird is admirably fitted by nature to purſue them through their ſhorteſt turnings. Beſides a great length of wing, it is alſo provided with a long tail, which, like a rudder, turns it in its moſt rapid motions; and thus, while it is poſſeſſed of the greateſt ſwiftneſs, it is alſo poſſeſſed of the moſt extreme agility.

The neſt of theſe birds is built with great induſtry and art; it is formed of mud from ſome neighbouring brook, well tempered with the bill, moiſtened with water for the better adheſion, and ſtill farther kept firm, by long graſs and fibres: within it is lined with gooſe feathers, which are ever the warmeſt and the neateſt. The martin covers its neſt at top, and has a door to enter at; the ſwallow leaves her's quite open. But our European neſts are nothing to be compared with thoſe the *eſculent ſwallow* builds on the coaſts of China and Coromandel; the deſcription of which we give, in the plain honeſt phraſe of Willoughby. "On the ſea-coaſt of the kingdom of China," ſays he, "a ſort of party-coloured birds, of the ſhape of "ſwallows, gather a certain clammy, glutinous matter, "perchance the ſpawn of whales and other young fiſhes, "of which they build their neſts, wherein they lay their "eggs and hatch their young. Theſe neſts the Chineſe "pluck from the rocks, and bring them in great numbers "into the Eaſt-Indies to ſell. They are eſteemed, by

" gluttons, as great delicacies; who, diſſolving them in
" chicken, or mutton-broth, are very fond of them; far
" before oyſters, muſhrooms, or other dainty and
" lickoriſh morſels."

At the latter end of September the ſwallows leave us; and for a few days previous to their departure, aſſemble, in vaſt flocks, on houſe-tops, as if deliberating on the fatiguing journey that lies before them. This is no ſlight undertaking, as their flight is directed to Congo, Senegal, and along the whole Morocco ſhore. There are ſome, however, left behind in this general expedition, that do not depart till eight or ten days after the reſt. Theſe are chiefly the latter weakly broods, which are not yet in a condition to ſet out.

Thoſe that migrate are firſt obſerved to arrive in Africa about the beginning of October. They are thought to have performed their fatiguing journey in the ſpace of ſeven days. They are ſometimes ſeen, when interrupted by contrary winds, wavering in their courſe far off at ſea, and lighting upon whatever ſhip they find in their paſſage. They then ſeem ſpent with famine and fatigue, yet ſtill they boldly venture, when refreſhed by a few hours reſt, to renew their flight, and continue the courſe which they had been ſteering before.

THE GOATSUCKER (See pl. LXI.) is nearly allied to the ſwallow, both in form and manners. Like the ſwallow, it is remarkable for the wideneſs of its gape; like it, it feeds upon inſects; like it, collects its food upon the wing; indeed by ſome authors it has been termed the nocturnal ſwallow, for it preys entirely in the night, or rather in the duſk of the evening, when the other ſwallows are retired to reſt.

There is only one ſpecies known in Europe, and this is conſiderably larger than the ſwallow, being 10½ inches in length, and in weight two ounces and an half. The ground of the plumage is almoſt black, but it is beautifully diverſified with aſh-colour and white in different parts; and it has, like all the kind, a number of briſtles about the bill. It is a great deſtroyer of cock-chaffers and beetles; and its note reſembles the noiſe of a ſpinning-wheel. From its nocturnal habits it has been called the night-hawk, and the chum-owl. It is diſtinguiſhed from the ſwallows by not having a forked tail. It viſits England about May, and returns in Auguſt. There appears to be no other ground for the ridiculous ſtory of its ſucking the goats, but the width of its mouth, which is to be accounted for on much more rational principles. It makes no neſt, but lays its eggs on the bare ground, or ſome looſe crag, without any ſeeming care whatever.

There are about ſixteen foreign ſpecies of this bird, one of which is called the *Grand Goatſucker*, and is the ſize of a ſmall buzzard: it inhabits Cayenne.

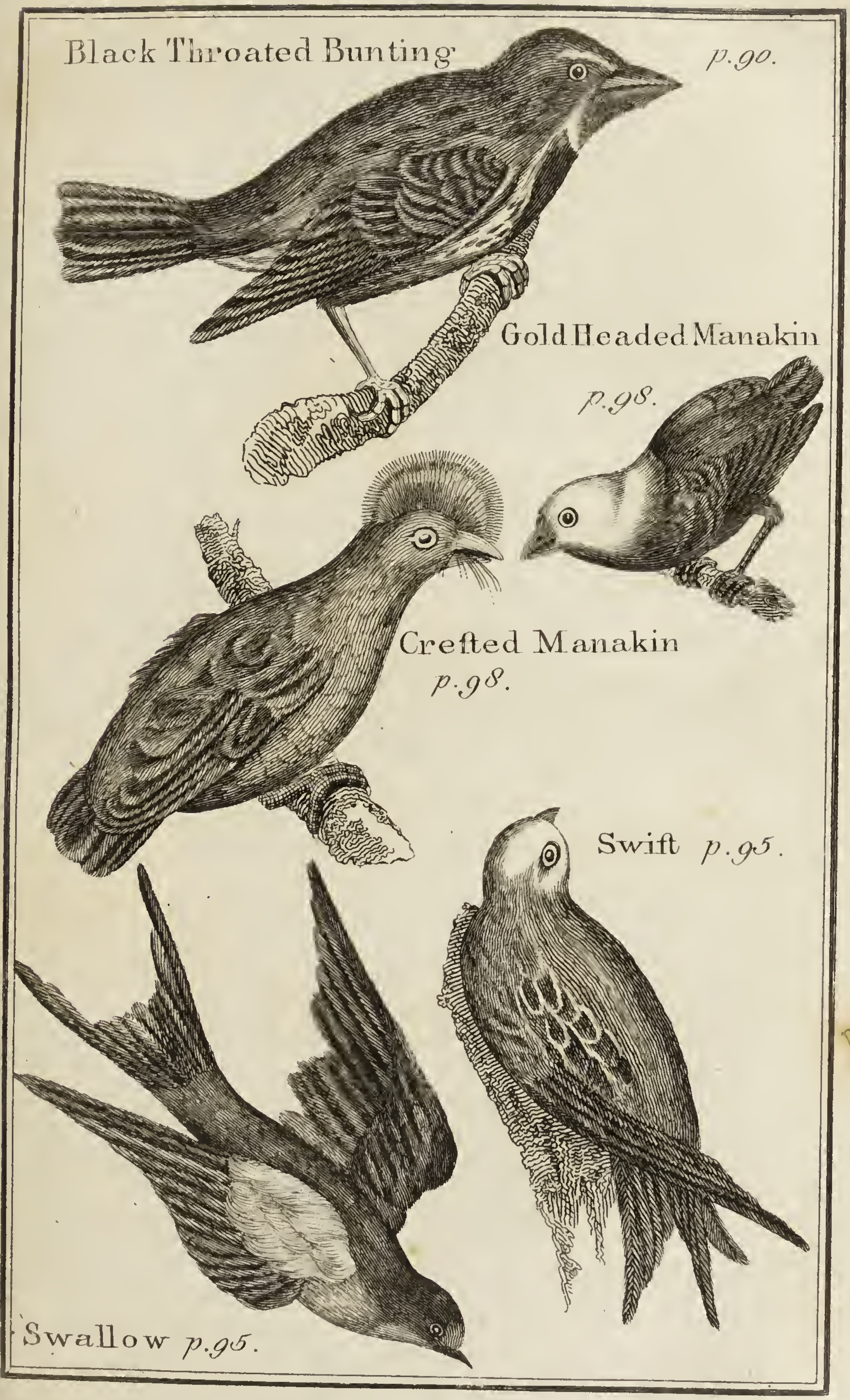
There are a few foreign birds belonging to this order, which are not reducible to any of the preceding genera, and which, therefore, agreeably to our former practice, we introduce at the concluſion of the European birds.

THE COLY genus includes about five ſpecies of foreign birds, much reſembling each other in character and manners. As a ſpecimen we have ſelected the *White-backed Coly*, (See pl. LVI.) which is an inhabitant of the Cape of Good Hope. It is in length twelve inches. The general colour of the plumage is bluiſh aſh-colour; the head is very full creſted; the under parts of the body are whitiſh, and a ſtripe of pure white runs the whole way down the middle of the back. The tail is uniform, and of an immenſe length.

THE TANAGER has been called the red-breaſted blackbird, and the greater bulfinch. The genus includes about forty-five ſpecies. They are in general about the ſize of the canary bird, and vary in plumage according to the ſpecies and the climate. They bear much relation to the bulfinch, and are found in all the warm climates of America, north and ſouth.

As the laſt ſpecies bears a reſemblance to the bulfinch, ſo the MANAKINS may be ſaid to bear ſome relation to the titmouſe. They vary, however, from the ſize of a pigeon, to that of a ſmall wren. The *Rock*, or *Creſted Manakin*, (See pl. LIX.) is about ten inches long. The general colour of the plumage is orange, and the head is covered with a beautiful double creſt. This ſpecies inhabits Surinam, Cayenne, &c. It makes its neſt of a few dry ſticks. They are in general ſhy; but are ſometimes rendered ſo tame, that they run along with the poultry.

The *Gold-headed Manakin* (See pl. LIX.) is in the other extreme, being only three inches and a quarter long; but


Black Throated Bunting p.90.
Gold Headed Manakin p.98.
Creſted Manakin p.98.
Swift p.95.
Swallow p.95.

it is a moſt beautiful animal. The head and neck are of a fine golden orange, and the reſt of the body, wings, and tail, are of a purpliſh black.

CHAP. XXVII.

Of water-fowl with cloven feet—The SPOON-BILL—*The* HERON—*The Bittern—The Crane—The Egret—The Stork—The Balearic Crane—The Gigantic Crane—The Demoiſelle, or Buffoon Bird—The* IBIS—*The Bay and Egyptian Ibis—The* CURLEW—*The* SNIPE—*The Woodcock—The Godwit—The Greenſhank—The Redſhank—The Jack Snipe—The Sandpiper—The Lapwing—The Ruff—The Knol—The Punc—The Turnſtone—The Dunlin—The* PLOVER—*The Golden and Long-legged Plovers—The Dotterel—The Sanderling—The Ringed Plover—The* OYSTER CATCHER—*The* PRATINCOLE—*The* RAIL—*The* GALLINULE—*The Crake—The Water Hen—The Spotted and Purple Gallinule—The* JABIRU—*The* SCREAMER—*The* BOATBILL—*The* UMBRE—*The* JACANA—*The* SHEATHBILL—*Water-fowl with pinnated Feet—The* PHALAROPE—*Grey and Red Phalarope—The* COOTE—*The* GREBE—*The creſted, eared and red-necked Grebe.*

Cloven footed Water-Fowl.

THE claſſification which has been adopted by Mr. Pennant, and the later naturaliſts, is peculiarly well calculated to prevent confuſion in ſo numerous a liſt of genera and ſpecies as the deſcription of water-fowl preſents to our view. They divide them into three orders, thoſe with cloven feet, or the crane kind, thoſe with pinnated, or finned feet, which are much leſs numerous than the preceding, and thoſe with webbed feet, or the ſwan or duck kind. The ſimplicity of this arrangement is a further recommendation; and with a few exceptions, it appears a claſſification which completely ſeparates animals that have ſcarcely any properties in common. If we except the flamingo, the avoſetta, and the courier, (which though they are web-footed, certainly partake of the nature of the crane,) all the web-footed fowl are of a ſquat make, and of a waddling gait, with their legs placed far behind, and their necks in general diſproportionably long. The make of the *waders*, or cloven-footed water-fowl, is, on the contrary,

tall,

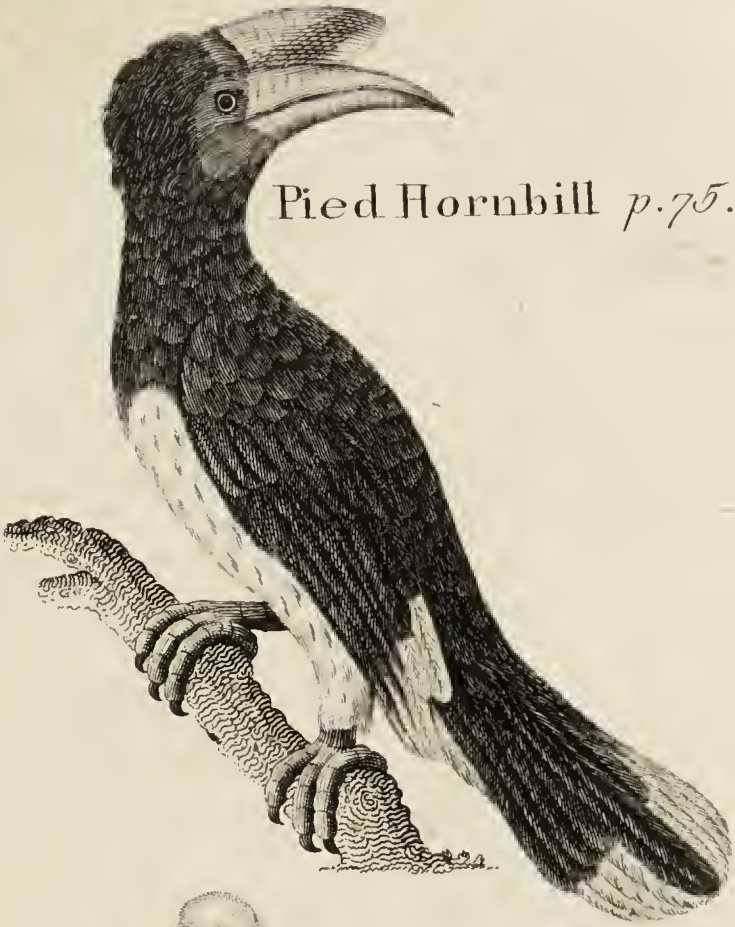
tall, light, and, in general, of a pleaſing proportion. Thoſe with finned feet conſtitute, as it were, a middle race, being calculated both for ſwimming and wading, and partake of the nature of both. The cloven-footed lay their eggs on the ground, and make no neſts. Thoſe with pinnated feet form large neſts in the water or near it; and the web-footed fowl depoſit their eggs for the moſt part on lofty cliffs, or inacceſſible promontories.

In this diviſion of birds, the firſt which modern naturaliſts preſent to our conſideration, is the SPOONBILL, (See pl. LX.) a bird remarkable for the curious form of its bill, which in our European ſpoonbill is ſix inches and a half long. This ſpecies is the ſize of a heron, or about two feet eight inches long. Its body is more bulky in proportion to its height than moſt of the crane kind. Yet ſtill it is a comparatively tall bird; it feeds among waters; its toes are divided; and it ſeems to poſſeſs the natural diſpoſitions of the crane. The common colour of thoſe of Europe, is a dirty white; but thoſe of America are of a beautiful *roſe colour*, or a delightful crimſon. Beauty of plumage ſeems indeed, to be the prerogative of all the birds of that continent. The bill which runs out broad at the end, as its name juſtly ſerves to denote, is there about an inch and a half wide. This ſtrangely faſhioned inſtrument, in ſome is black; in others of a light grey; and in thoſe of America, it is of a red colour, like the reſt of the body. All round the upper chap there runs a kind of rim, with which it covers that beneath; and as for the reſt, its cheeks and its throat are without feathers, and covered with a black ſkin. There is a *dwarf* ſpoonbill at Surinam, not above the ſize of a ſparrow.

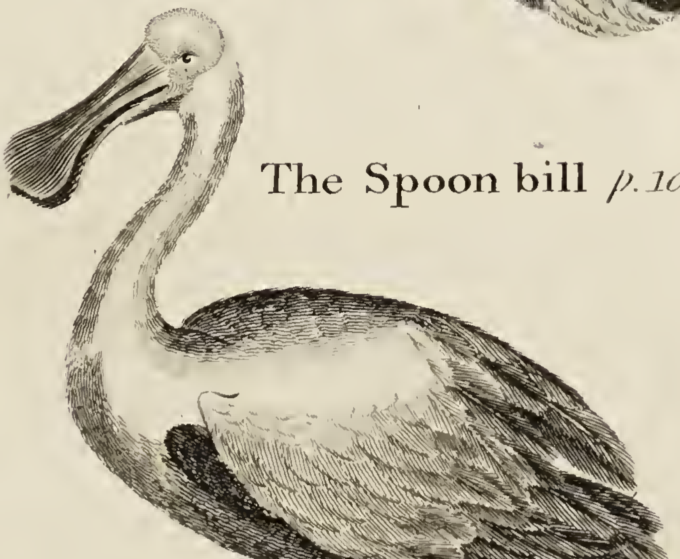
THE HERON.] Of this genus Latham has enumerated not leſs than eighty-two ſpecies, all differing in their ſize, figure, and plumage; and with talents adapted to their place of reſidence, or their peculiar purſuits. But how various ſoever the heron kind may be in their colours or their bills, they all ſeem poſſeſſed of the ſame manners, and have but one character of cowardice and rapacity, indolence, yet inſatiable hunger. Other birds are found to grow fat by an abundant ſupply of food; but theſe, though exceſſively deſtructive and voracious, are ever found to have lean and carrion bodies, as if not even plenty were ſufficient for their ſupport.

The

Plate.60.



Pied Hornbill *p.75.*



The Spoon bill *p.100.*

The common heron is remarkably light, in proportion to its bulk, ſcarce weighing three pounds and an half, yet it expands a breadth of wing which is five feet from tip to tip. Its bill is very long, being five inches from the point to the baſe; its claws are long, ſharp, and the middlemoſt toothed like a ſaw. Yet, thus armed as it appears for war, it is indolent and cowardly, and even flies at the approach of a ſparrow-hawk. Of all birds, this commits the greateſt devaſtation in freſh-waters; and there is ſcarcely a fiſh, though ever ſo large, that he will not ſtrike at and wound, though unable to carry it away. But the ſmaller fry are his chief ſubſiſtence; theſe, purſued by their larger fellows of the deep, are obliged to take refuge in ſhallow waters, where they find the heron a ſtill more formidable enemy. His method is to wade as far as he can go into the water, and there patiently wait the approach of his prey, which when it comes within ſight, he darts upon with an inevitable aim. In this manner he is found to deſtroy more in a week than an otter in three months. "I have ſeen an "heron," ſays Willoughby, "that had been ſhot, that had "ſeventeen carps in his belly at once, which he will digeſt "in ſix or ſeven hours. I have ſeen a carp," continues he, "taken out of a heron's belly, nine inches and half "long. Several gentlemen who kept tame herons, to try "what quantity one of them would eat in a day, have put "ſeveral ſmaller roach and dace in a tub; and they have "found him eat fifty in a day, one day with another. In "this manner a ſingle heron will deſtroy fifteen thouſand "carp in a ſingle half year."

But, though in ſeaſons of fine weather the heron can always find a plentiful ſupply; in cold or ſtormy ſeaſons, his prey is no longer within reach: the fiſh that before came into the ſhallow water now keep in the deep, as they find it to be the warmeſt ſituation. Frogs and lizards alſo ſeldom venture from their lurking places; and the heron is obliged to ſupport himſelf upon his long habits of patience, and even to take up with the weeds that grow upon the water. At thoſe times he contracts a conſumptive diſpoſition, which ſucceeding plenty is not able to remove; ſo that the meagre glutton ſpends his time between want and riot, and feels alternately the extremes of famine and exceſs. Hence, notwithſtanding the care with which he takes his prey, and the amazing quantity he devours, the heron is always lean and emaciated; and though his crop be uſually found full, yet his fleſh is ſcarce ſufficient to cover the bones.

Though this bird lives chiefly among pools and marſhes, yet its neſt is built on the tops of the higheſt trees, and ſometimes on cliffs hanging over the ſea. They are never in flocks when they fiſh, committing their depredations in ſolitude and ſilence; but in making their neſts they love each others ſociety; and they are ſeen, like rooks, building in company with flocks of their kind. Their neſts are made of ſticks and lined with wool; and the female lays four large eggs of a pale green colour. The obſervable indolence of their nature, however, is not leſs ſeen in their neſtling than in their habits of depredation. Nothing is more certain, and we have ſeen it an hundred times, than that they will not be at the trouble of building a neſt when they can get one made by the rook, or deſerted by the owl, already provided for them. This they uſually enlarge and line within, driving off the original poſſeſſors, ſhould they happen to renew their fruitleſs claims.

The heron is ſaid to be a very long lived bird; by Mr. Keyſler's account it may exceed ſixty years; and by a recent inſtance of one that was taken in Holland, by an hawk belonging to the ſtadtholder, its longevity is again confirmed, the bird having a ſilver plate faſtened to one leg, with an inſcription, importing that it had been ſtruck by the elector of Cologne's hawks thirty-five years before.

Of all the ſpecies which have been mentioned above, only three appear to be known in England, viz. the common heron, which we have been deſcribing, and which is blue, the *white heron*, and the *bittern*, or *mire-drum*.

Thoſe who have walked in an evening by the ſedgy ſides of unfrequented rivers, muſt remember a variety of notes from different water-fowl: the loud ſcream of the wild gooſe, the croaking of the mallard, the whining of the lapwing, and the tremulous neighing of the jack ſnipe. But of all thoſe ſounds, there is none ſo diſmally hollow as the booming of the *bittern*. It is impoſſible for words to give thoſe who have not heard this evening-call an adequate idea of its ſolemnity. It is like the interrupted bellowing of a bull, but hollower and louder, and is heard at a mile's diſtance, as if iſſuing from ſome formidable being that reſided at the bottom of the waters.

The bird, however, that produces this terrifying ſound is not ſo big as an heron, with a weaker bill, and not above four inches long. It differs from the heron chiefly in its colour, which is in general of a paliſh yellow, ſpotted and barred with black. Its wind-pipe is fitted to produce the ſound for which it is remarkable; the lower part of it dividing into the lungs, is ſupplied with a thin looſe membrane, that can be filled with a large body of air, and exploded at pleaſure. Theſe bellowing exploſions are chiefly heard from the beginning of ſpring to the end of autumn; and, however awful they may ſeem to us, are the calls to courtſhip, or connubial felicity.

This bird, though of the heron kind, is yet neither ſo deſtructive nor ſo voracious. It is a retired, timorous animal, concealing itſelf in the midſt of reeds and marſhy places, and living upon frogs, inſects, and vegetables; and though ſo nearly reſembling the heron in figure, yet differing much in manners and appetites. It lays its eggs in a ſedgy margin, or amidſt a tuft of ruſhes, and compoſes its ſimple habitation of ſedges, the leaves of water plants, and dry ruſhes. It lays generally ſeven or eight eggs of an aſh-green colour, and in three days leads its little ones to their food.

The fleſh of the bittern is greatly in eſteem among the luxurious. For this reaſon, it is as eagerly ſought after by the fowler as it is ſhunned by the peaſant; and as it is a heavy-riſing, ſlow-winged bird, it does not often eſcape him. Indeed, it ſeldom riſes but when almoſt trod upon; and ſeems to ſeek protection rather from concealment than flight. At the latter end of autumn, however, in the evening, its wonted indolence appears to forſake it. It is then ſeen riſing in a ſpiral aſcent till it is quite loſt from the view, and makes at the ſame time a ſingular noiſe very different from its former boomings.

The *Crane*, (See pl. LII.) is alſo a bird which naturaliſts place in the heron genus. Willoughby and Pennant make the ſize of this bird from five to ſix feet long, from the tip to the tail. Other accounts ſay, that it is above five feet high; and others that it is as tall as a man. A bird, however, the body of which is not larger than that of a turkey-hen, and acknowledged on all hands not to weigh above ten pounds, cannot eaſily be ſuppoſed to be almoſt as long as an oſtrich. Briſſon, therefore, ſeems to give this bird its real dimenſions, when he deſcribes it about three feet high, and about four from the tip to the tail. But, perhaps, that from which he took his dimenſions, was one of the ſmalleſt of the kind.

It is a tall, ſlender bird, with a long neck and long legs. The top of the head is covered with black briſtles, and the back of it is bald and red, which ſufficiently diſtinguiſhes this bird from the ſtork, to which it is very nearly allied in ſize and figure. The plumage, in general, is aſh-coloured; and there are two large tufts of feathers, that ſpring from the pinion of each wing. Theſe bear a reſemblance to hair, and are finely curled at the ends, which the bird has a power of erecting and depreſſing at pleaſure. Geſner ſays, that theſe feathers, in his time, uſed to be ſet in gold, and worn as ornaments in caps.

The crane is a very ſocial bird, and they are ſeldom ſeen alone. Their uſual method of flying or ſitting is in flocks of fifty or ſixty together; and while a part feed, the reſt ſtand like centinels upon duty. It for the moſt part ſubſiſts upon vegetables; and is known in every country of Europe, except England. As they are birds of paſſage, they are ſeen to depart and return regularly at thoſe ſeaſons when their proviſion invites or repels them. They generally leave Europe about the latter end of autumn, and return in the beginning of ſummer. In the inland parts of the continent, they are ſeen croſſing the country, in flocks of fifty or an hundred, making from the northern regions towards the ſouth. In theſe migrations, however, they are not ſo reſolutely bent upon going forward, but that if a field of corn offers in their way, they will ſtop a while to regale upon it: on ſuch occaſions they do incredible damage, chiefly in the night; and the huſbandman, who lies down in joyful expectation, riſes in the morning to ſee his fields laid entirely waſte, by an enemy, whoſe march is too ſwift for his vengeance to overtake.

The cold arctic region ſeems to be this bird's favourite abode. They come down into the more ſouthern parts of Europe rather as viſitants than inhabitants.

In their journeys it is amazing to conceive the heights to which they aſcend, when they fly. Their note is the loudeſt of all birds; and is often heard in the clouds, when the bird itſelf is entirely unſeen. As it is light for its ſize, and ſpreads a large expanſe of wing, it is capable of floating, at the greateſt height, where the air is lighteſt; and as it ſecures its ſafety, and is entirely out of the reach of man, it flies in tracts which would be too fatiguing for any other birds to move forward in.

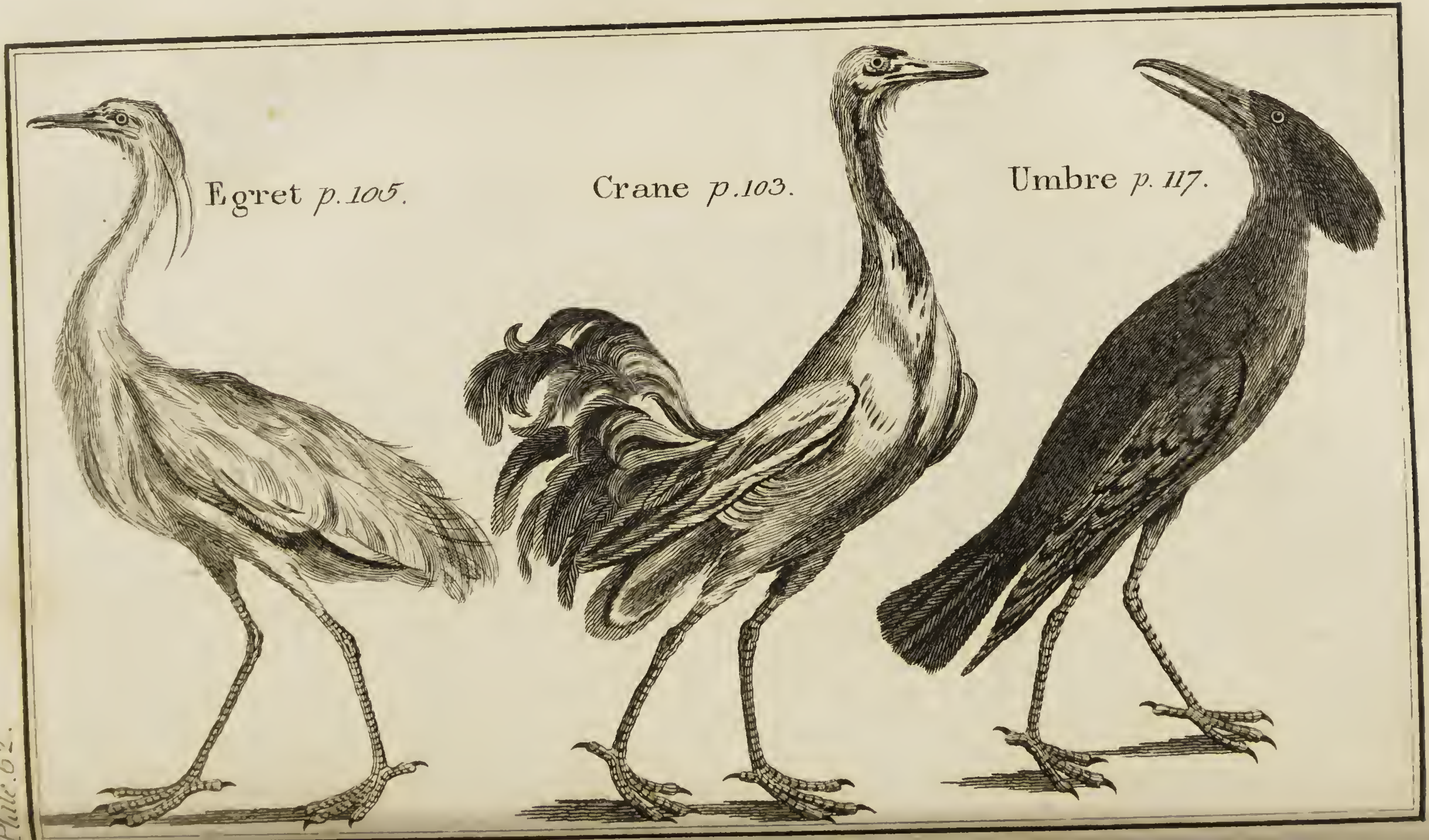

Egret p.105.
Crane p.103.
Umbre p. 117.

Plate.62.

In theſe aerial journeys, though unſeen themſelves, they have the diſtincteſt viſion of every object below. They govern and direct their flight by their cries: and exhort each other to proceed or deſcend, when a fit opportunity offers for depredation. As they riſe but heavily, they are very ſhy birds, and ſeldom let the fowler approach them. Corn is their favourite food; but there is ſcarcely any other that comes amiſs to them. Redi, who opened ſeveral, found the ſtomach of one full of the herb called dandelion; that of another was filled with beans; a third had a great quantity of clover in its ſtomach; while thoſe of two others were filled with earth-worms and beetles: in ſome he found lizards and ſea-fiſh; in others, ſnails, graſs, and pebbles, ſwallowed perhaps for medicinal purpoſes.

In general it is a peaceful bird, both in its own ſociety, and with reſpect to thoſe of the foreſt. It is an animal eaſily tamed; and if we can believe Albertus Magnus, has a particular affection for man.

The *Egret*, (See pl. LXII.) is of the crane kind, but only one ſpecies is known in Europe, which is called the *little egret*. It is the ſize of a fowl. The hind head is creſted, and two of the feathers, which are five inches in length, hang gracefully behind. The whole plumage is of a beautiful white, and the elegance of the bird is much increaſed by the long, looſe feathers which cover and hang over the rump: their fleſh is ſaid to be excellent. It is conjectured that both the crane and egret were formerly inhabitants of Great Britain; but this can hardly be ſaid of them at preſent, notwithſtanding a ſolitary inſtance or two of their having been ſhot there. In America there are egrets found of a reddiſh, and ſome of a black colour; but they differ in no other reſpect from the European.

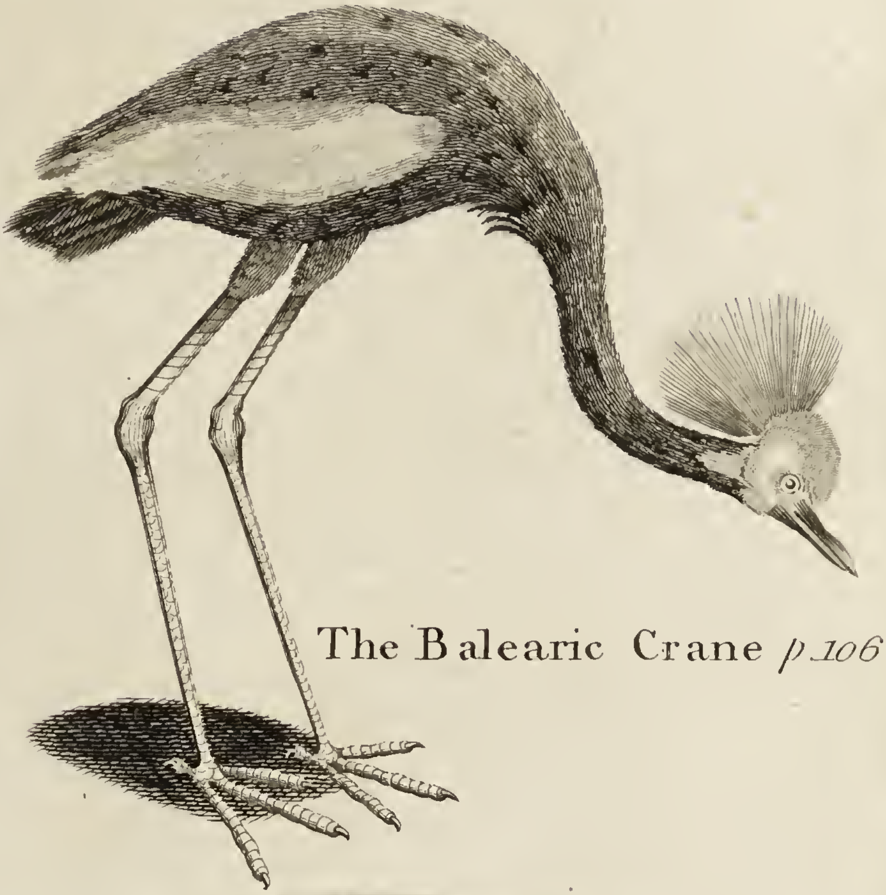
Storks are birds of paſſage, like the crane; but it is hard to ſay whence they come or whither they go. When they withdraw from Europe, they all aſſemble on a particular day, and never leave one of their company behind them. They take their flight in the night; which is the reaſon the way they go has never been obſerved. They generally return into Europe in the middle of March, and make their neſts on the tops of chimneys and houſes as well as of high trees. The females lay from two to four eggs, of the ſize and colour of thoſe of geeſe. They are a month in hatching; and when their young are excluded, they are particularly ſolicitous for their ſafety.

The *Common Stork*, (See pl. LXIII.) is quite *white*, except the greater wing coverts and the quills. The *American Stork* nearly anſwers to the ſame deſcription; but in the northern countries of Europe there are *Black Storks*, ſo called from the general appearance of their plumage; they are, however, by no means ſo numerous as the white.

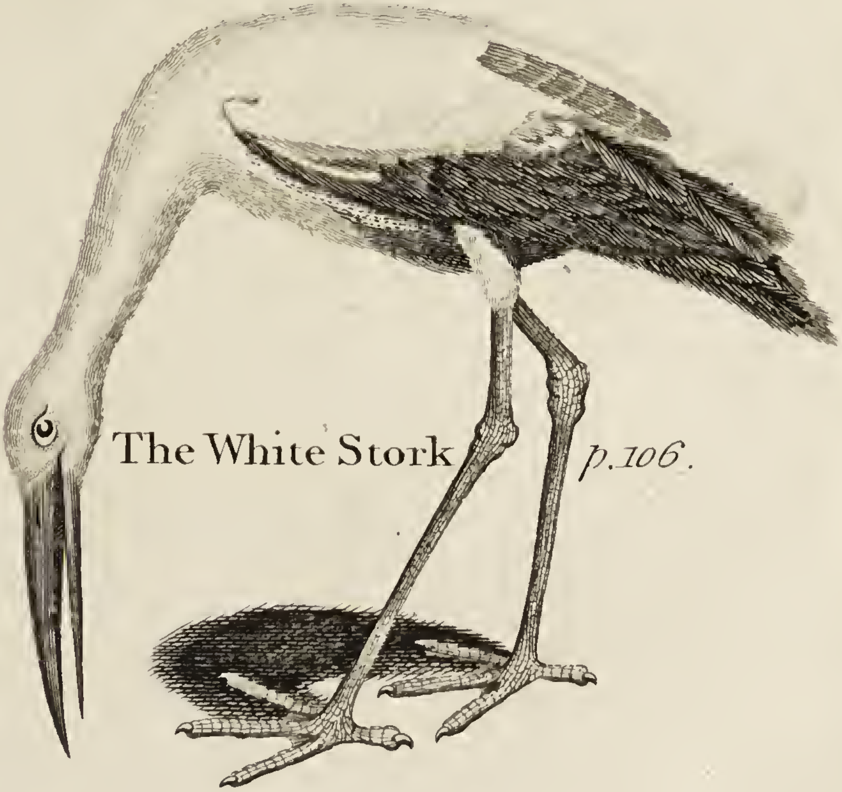
As the food of theſe birds conſiſts in a great meaſure of frogs and ſerpents, it is not to be wondered at that different nations have paid them a particular veneration. The Dutch are very ſolicitous for the preſervation of the ſtork in every part of their republic. This bird ſeems to have taken refuge among their towns; and builds on the tops of their houſes without any moleſtation. There it is ſeen reſting familiarly in their ſtreets, and protected as well by the laws as the prejudices of the people.

Many foreign birds of this genus are of extraordinary beauty, ſize, and ſingularity; among theſe the *Crowned Heron*, or *Balearic Crane*, (See pl. LXIII.) for a long time continued unknown, till we became acquainted with the birds of tropical climates, when one of the crane kind with a topping was brought into Europe, and deſcribed by Aldrovandus as Pliny's balearic crane. It is pretty nearly of the ſhape and ſize of the ordinary crane, with long legs and a long neck, like others of the kind; but the bill is ſhorter, and the colour of the feathers of a dark greeniſh grey. The head and throat form the moſt ſtriking part of this bird's figure. On the head is ſeen ſtanding up a thick round creſt, made of briſtles, ſpreading every way, and reſembling rays ſtanding out in different directions. The longeſt of theſe rays are about three inches and an half; and they are all topped with a kind of black taſſels, which give them a beautiful appearance. The ſides of the head and cheeks are bare, whitiſh, and edged with red, while underneath the throat hangs a kind of bag or wattle, like that of a cock, but not divided into two. This bird comes from the coaſt of Africa and the Cape de Verd Iſlands. As it runs, it ſtretches out its wings, and goes very ſwiftly, otherwiſe its uſual motion is very ſlow. In their domeſtic ſtate, they walk very deliberately among other poultry, and ſuffer themſelves to be approached by every ſpectator. They never rooſt in houſes: but about night, when they are diſpoſed to go to reſt, they ſearch out ſome high wall, on which they perch in the manner of a peacock. Indeed, they ſo much reſemble that bird in manners and diſpoſition, that ſome have deſcribed them by the name of the ſea-peacock.

Plate. 63.



The Balearic Crane *p.106.*



The White Stork *p.106.*

cock. But though their voice and rooſting be ſimilar, their food, which is entirely greens, vegetables, and barley, ſeems to make ſome difference.

The *Gigantic Crane* (See pl. LXVI.) will frequently meaſure ſeven feet and an half, when ſtanding erect, and from the tip of one wing to that of the other, fourteen feet ten inches. The head and neck are naked, and of a yellowiſh colour. The feathers on the back and wings are of an iron colour, thoſe of the breaſt and belly of a dirty white. The craw hangs down on the fore-part of the neck, like a pouch, and the lower part is hairy. Theſe birds are gregarious, and when their wings are ſpread appear like a number of canoes on the ſurface of the water. They may be eaſily tamed, and become ſo familiar that a young one at the King of the Bananas in Africa became ſo troubleſome, that the ſervants were obliged to guard the proviſions by beating it off with ſwitches; but notwithſtanding this, it commonly purloined ſomething, and one day was known to ſwallow at a mouthful a whole boiled fowl. It was accuſtomed to rooſt very high among the cotton trees, whence, at two or three miles diſtance, it could ſpy the dinner carrying acroſs the yard, when darting from its ſtation, it would enter promiſcuouſly with the perſons who carried in the diſhes. This monſter inhabits the ſouthern parts of Africa and India. It preys upon birds, reptiles, and ſmall quadrupeds. On opening one of them a land tortoiſe, ten inches long, and a large black cat were found entire in its ſtomach.

The *Wattled Heron* (See pl. LXIX.) is a very curious bird. The top of the head is blue-grey, the reſt of the head and neck white, under the chin are two wattles covered with white feathers. The back and wings are blue grey, and the quills and belly are black. This bird is a native of Africa.

One bird more may be ſubjoined to this genus, not for the oddity of its figure, but the peculiarity of its manners. It is vulgarly called by our ſailors, the *buffoon* bird, and by the French the *demoiſelle*, or lady. The peculiar geſtures and contortions of this bird, the proper name of which is the *Numidian Crane*, are extremely ſingular. It ſtoops, riſes, lifts one wing, then another, turns round, ſails forwards, then back again; all which highly diverts our ſeamen; not imagining, perhaps, that all theſe contortions are but the awkward expreſſion not of the poor animal's pleaſures, but its fears.

It is a very ſcarce bird; the plumage is of a leaden grey but it is diſtinguiſhed by fine white feathers, conſiſting of long fibres, which fall from the back of the head, about four inches long; while the fore-part of the neck is adorned with black feathers, compoſed of very fine, ſoft, and long fibres, that hang down upon the ſtomach, and give the bird a very graceful appearance.

The Ibis ſcarcely deſerves the name of an European bird, ſince only one ſpecies is found there; viz. the *Bay Ibis*, which is not larger than a curlew, or one foot nine inches long. The upper parts of the body are gloſſy-green, and the lower parts are brown, with a gloſs of gold on the breaſt. It inhabits Italy, ſome parts of Germany, and about the Caſpian and Black Seas.

The *Egyptian Ibis*, ſo famous in hiſtory and mythology, is larger than the ſtork, meaſuring from thirty to forty inches in length. The bill is ſeven inches long, is ſlightly curved, and ends in a blunt point. The plumage is a reddiſh-white, moſt inclining to red on the back and wings. It is found in great numbers in Lower Egypt, in places juſt freed from the inundations of the Nile, where it is of ſignal ſervice in deſtroying inſects, reptiles, &c. This bird is frequently found in the ſepulchres along with the mummies, and was formerly held ſacred by the Egyptians.

The *Black-faced Ibis* (See pl. LXI.) is in length about twenty-eight inches. The whole face quite beyond the eyes, is bare of feathers, black and warty, and under the chin hangs a looſe, wrinkled ſkin, forming a pouch. The head, neck and breaſt are yellow, with a bar of aſh-colour acroſs the latter; the reſt of the body is aſh-colour. It was found on New Year's Iſland, near Staten Land.

The Curlew (See pl. LXV.) is a well known bird, which in winter frequents our ſea-coaſts and marſhes, feeding chiefly on frogs and marine inſects. In ſummer they retire to the mountainous and unfrequented parts to breed. Their fleſh is rank and fiſhy. Curlews differ much in ſize, ſome weighing thirty-ſeven ounces, and ſome not twenty-two; the length of the largeſt is twenty-five inches. The upper parts of the plumage are of a pale-brown; the breaſt and belly white, marked with dark oblong ſpots. Latham enumerates about eleven ſpecies, foreign and domeſtic.

The Snipe genus includes better than thirty ſpecies. Of theſe the *Woodcock* is the moſt eſteemed by the epicures. The *Godwit* is leſs known:—It weighs twelve ounces and an half, and is in length ſixteen inches. From the bill to the eye is a broad white ſtroke. The plumage on the upper parts is of a light reddiſh-brown, the belly white, the quills are blackiſh. They are taken in the fens, and when fattened, are eſteemed a great delicacy. The *Red Godwit* is larger, but leſs common in England.

The *Green-ſhank* is not ſo common as the godwit: It is about fourteen inches in length; the bill two inches and an half long. The plumage on the upper parts is a brown aſh colour; on the lower parts white: The legs are green, whence it takes its name. It has the ſame manners and character as the godwit, and has alſo a white line over the eye; but does not weigh more than half as much.

The *Red-ſhank* weighs about five ounces and an half, and is twelve inches long. The bill is two inches, red at the baſe, and black towards the point. The head, neck, and ſcapulars are duſky aſh-colour, obſcurely ſpotted with black; the back is white, ſpotted with black: The breaſt is white, ſtreaked with duſky lines. When its neſt is in danger, it makes a noiſe ſomewhat ſimilar to that of the lapwing.

The *Common Snipe* weighs about four ounces; but there is a ſpecies, though exceedingly rare, which is more than double that weight. The *Jack Snipe* was formerly ſuppoſed to be the male ſnipe, from its frequenting the ſame haunts; it is, however, now well known to be a different ſpecies. It weighs ſcarcely two ounces.

The Sandpiper genus includes of well-known birds, the *Lapwing*, the *Ruff*, the *Knot*, the *Purro*, the *Turnſtone*, and the *Dunlin*. The firſt of theſe is too common a bird to require a particular deſcription. The *Ruff* (See pl. LXVI.) is an animal leſs generally known, being confined to the north of Europe, during the ſummer, and in England only viſiting certain parts, viz. Lincolnſhire, the Iſle of Ely, and the adjacent parts of Yorkſhire, in the ſpring. The male, which is called the *Ruff*, from the remarkable bunch of feathers which ſurrounds its neck juſt below the head, is ſo various in its plumage, that it is not eaſily deſcribed; the ground is, however, moſtly brown. The female, which is called the *Reeve*, is leſs than the ruff, and has her plumage more of a uniform brown. This bird is ſo noted for its contentious ſpirit, that it has obtained the epithet of the fighter. In the beginning of ſpring, when theſe birds arrive among our marſhes, they are obſerved to engage, with deſperate fury, againſt each other. It is then that the fowlers, ſeeing them intent on mutual deſtruction, ſpread their nets over them, and take them in great numbers: yet, even in captivity, their animoſity ſtill continues. The people that fatten them up for ſale, are obliged to ſhut them up in cloſe, dark rooms; for if they let ever ſo little light in among them, the turbulent priſoners inſtantly fall to fighting with each other, and never ceaſe till each has killed its antagoniſt, eſpecially, ſays Willoughby, if any body ſtands by. A ſimilar animoſity, though in leſs degree, prompts all this tribe; but when they have paired, and begun to lay, their contentions are then over.

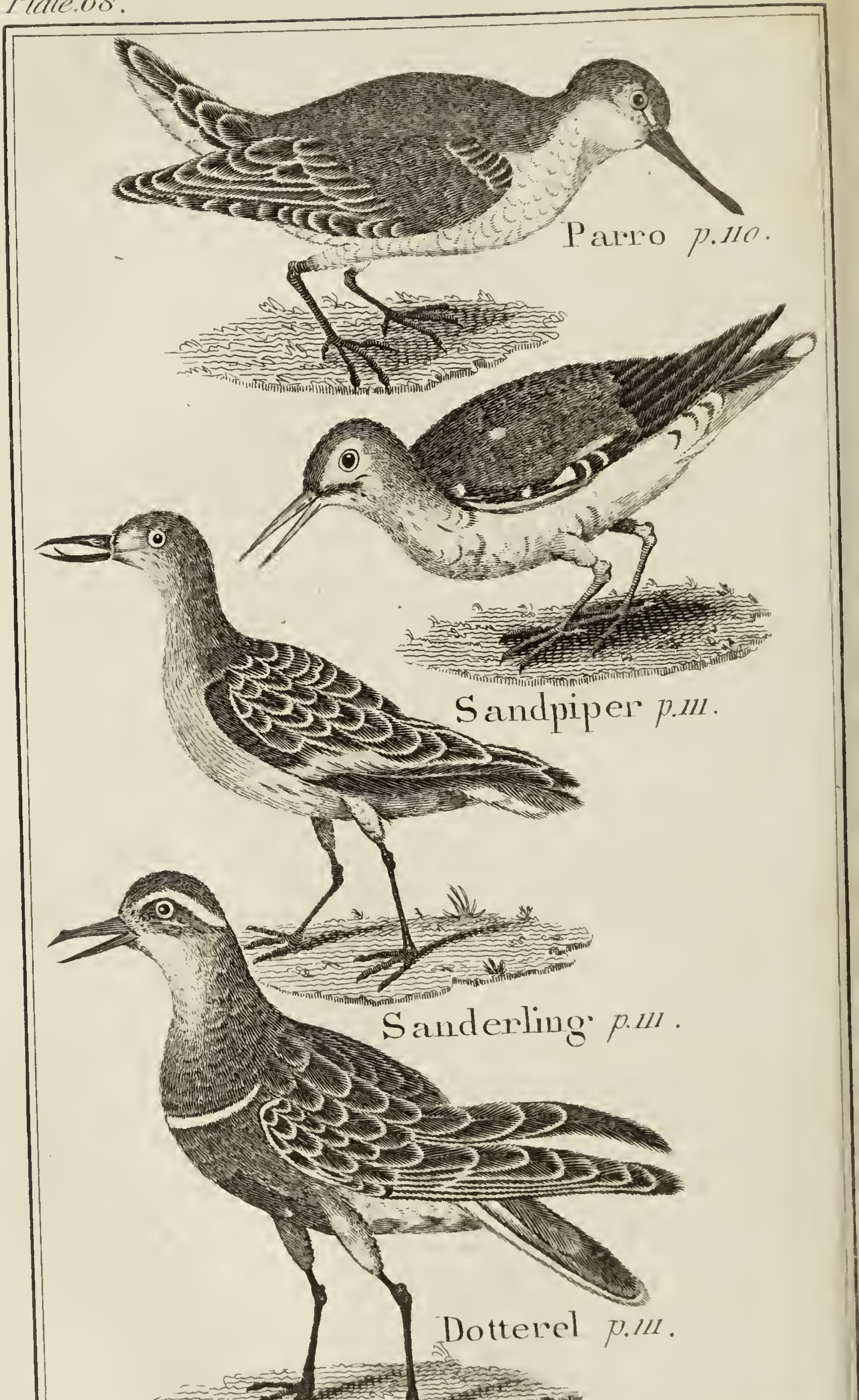
The *Knot* is three inches leſs than the ruff, meaſuring not more than nine inches, and weighing only four ounces and an half. The head and neck are aſh-colour, the back and ſcapulars brown, with a white bar on the wings. They frequent the coaſts of Lincolnſhire from Auguſt to November, and when fattened, are preferred by ſome to the ruffs themſelves.

The *Purro*, or *Stint*, weighs only an ounce and an half, and is in length ſeven inches. A white ſtroke divides the bill and eyes. The upper parts of the plumage are browniſh aſh-colour, the breaſt and belly white, as are the lower parts of the quill-feathers. Theſe birds come in vaſt flocks on our ſea-coaſts in winter, and in their flight obſerve uncommon regularity, appearing like a white or duſky cloud. They were formerly a frequent diſh at our tables, known by the name of ſtints.

The *Turnſtone* is about the ſize of a thruſh. The bill is nearly an inch long, and turns a little upwards. The head, throat, and belly, are white, the breaſt black, and the neck encircled with a black collar. The upper parts of the plumage are of a pale reddiſh brown. Theſe birds take their name from their method of finding their food, which is by turning up ſmall ſtones with their bills, to get at the inſects which lurk under them.

The *Dunlin* is the ſize of a jack ſnipe. The upper parts of the plumage are ferrugineous, marked with large ſpots of black, and a little white; the lower parts are white, with duſky ſtreaks. It is found in all the northern parts of Europe.

Plate 68.


Parro p. 110.
Sandpiper p. 111.
Sanderling p. 111.
Dotterel p. 111.

Of the *Sandpiper*, properly ſo called, there are about twelve ſpecies known in Europe, from the ſize of a thruſh to that of a hedge-ſparrow. The common ſandpiper is in weight about two ounces: The head is brown, ſtreaked with black, the back and coverts brown, mixed with gloſſy-green; the breaſt and belly pure white. Its note is louder and more piping than others of this genus. The *black*, the *green*, the *ſpotted*, the *red*, and the *gambel* ſandpiper, are not very common in England.

The genus includes forty ſpecies, foreign and domeſtic.

Under the deſcription of Plover about twenty-four ſpecies are comprehended.

The *Golden*, or *Green Plover*, is a well-known bird, and is found in ſmall flocks, in the winter-time, on all our moors, heaths, &c. It is remarkable for the whole of its plumage being elegantly variegated with a fine, yellowiſh-green. It may be enticed within gun-ſhot, by a ſkilful imitator of their voice, and is eſteemed as a delicacy. It is eleven inches in length, and weighs nine ounces.

The *Long-legged Plover* is a ſingular bird. Though inferior in ſize to the golden plover, it meaſures nearly a foot and a half when ſtanding erect, on which account it has been called the red legged crane. The head, back, and wings are gloſſy black, the rump and belly white. It is found in moſt quarters of the world, but is very uncommon in England.

The *Dotterel* is about ten inches in length, and weighs four ounces. The bill is ſhorter than that of the majority of this genus, being only an inch long. The head is black, ſpotted with white, and a white ſtroke runs over each eye meeting behind. The upper parts of the plumage are greyiſh brown margined with a dull deep yellow. The breaſt is a dull orange, and acroſs it is a ſtreak of white margined above with black. The colours of the female are leſs vivid. It is eſteemed a very fooliſh bird; and was believed to mimick the actions of the fowler, to ſtretch out a wing when he ſtretched out an arm, &c. regardleſs of the net which was ſpreading for it. They appear in England in ſmall flocks from April to September.

The *Sanderling* is eight inches long, but weighs only an ounce and three quarters. The bill is very weak and black, and an inch long. The head and neck are aſh coloured ſtreaked with black, the wings and back browniſh grey edged with white; all the under parts of the body are white. It is found in many parts of both continents, and is very plenty on the coaſts of Lancaſhire and Cornwall.

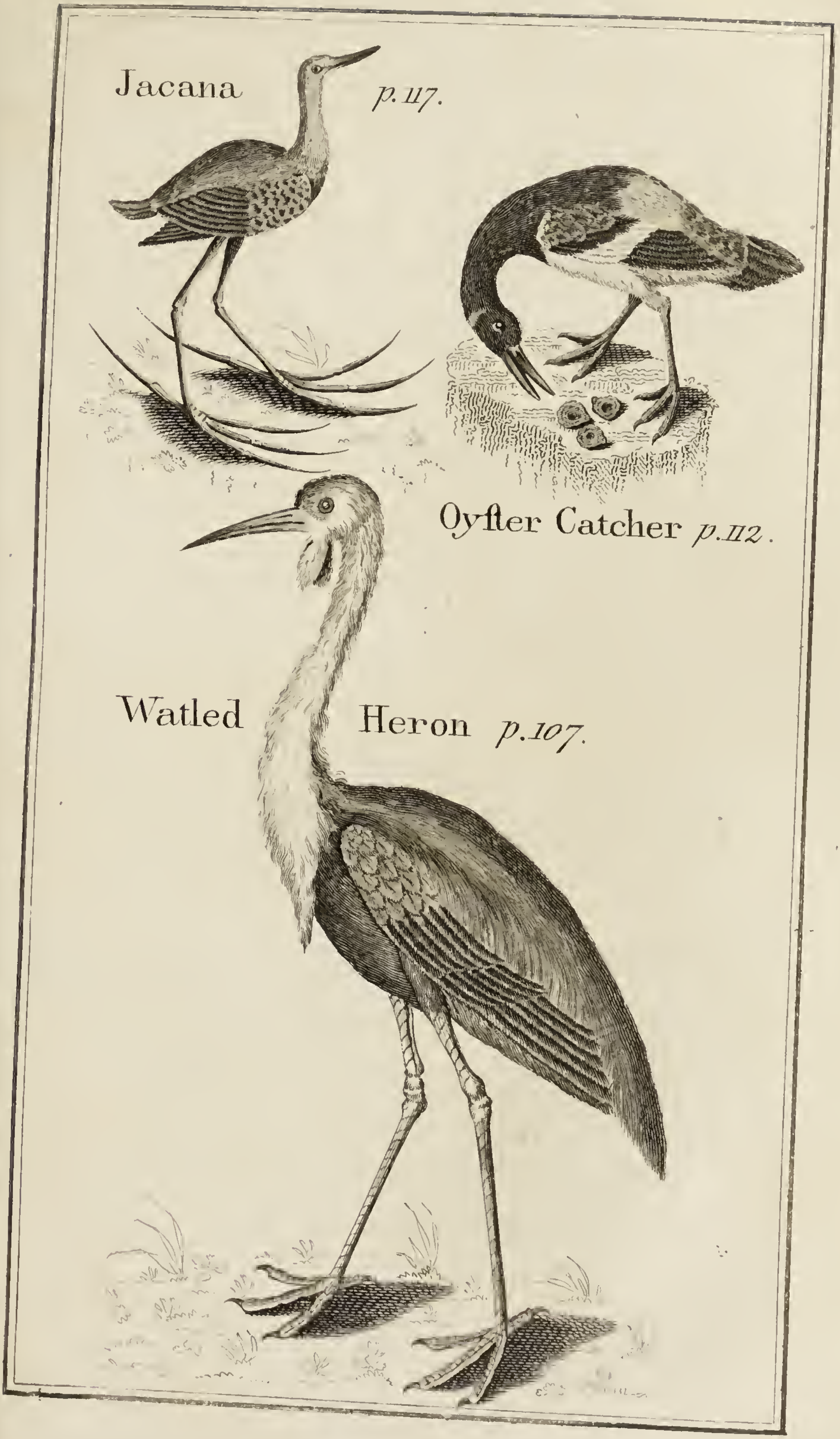
The *Ringed plover* is ſeven inches and a half long, though it weighs two ounces; the bill is half an inch long and from it to the eyes runs a black line. The upper part of the neck is encircled with a white collar; the lower part with a black one. The back and wings are light brown, the breaſt and belly are white, the legs yellow. They frequent our ſhores in ſummer, and are ſometimes known by the name of the *Sea lark*.

THE OYSTER CATCHER (See pl. LXIV.) is about the ſize of a crow, and is well known on our coaſts under the name of the Sea pie. Its bill is three inches in length, and of an orange colour. The head, neck, back and quills are black, except a creſcent of white, which runs acroſs the throat; the belly, rump and greater wing coverts are alſo white, and the tip of the tail black. It receives its name from its feeding upon ſhell fiſh, and particularly oyſters, which when it obſerves on any occaſion gaping wide enough for the inſertion of its bill, it thruſts it in, and without further ceremony deprives the ſhell of its inhabitant. We know of but one ſpecies, which is diffuſed over all quarters of the globe.

Theſe five laſt genera have a ſtrong affinity with each other, and all are diſtinguiſhed by ſimilar manners. As they are uſually employed rather in running than in flying, and as their food lies entirely upon the ground, and not on trees, or in the air, ſo they run with great ſwiftneſs for their ſize, and the length of their legs aſſiſts their velocity. But as, in ſeeking their food, they are often obliged to change their ſtation, ſo alſo they are equally ſwift of wing, and traverſe immenſe tracts of country, without much fatigue.

It has been thought by ſome, that a part of theſe birds lived upon an oily ſlime, found in the bottoms of ditches and of weedy pools; but later diſcoveries have ſhewn, that, in theſe places, they hunt for the caterpillars, worms, and inſects. The long-billed birds ſuck up worms and inſects from the bottom; thoſe furniſhed with ſhorter bills, pick up ſuch inſects as lie nearer the ſurface of the meadow, or among the ſands on the ſea-ſhore.

Plate 64.


Jacana *p. 117.*
Oyſter Catcher *p. 112.*
Watled Heron *p. 107.*

As all of this kind live entirely in waters, and among watery places, they ſeem provided by nature with a warmth of conſtitution to fit them for that cold element. They reſide, by choice, in the coldeſt climates; and, as other birds migrate here in our ſummer, their migrations hither are moſtly in the winter. Even thoſe that reſide among us the whole ſeaſon, retire, in ſummer, to the tops of our bleakeſt mountains; where they breed, and bring down their young when the cold weather ſets in.

The curlew, the woodcock, the ſnipe, the godwit, the golden, and the long-legged plover, the knot, and the turnſtone, are rather the gueſts than the natives of this iſland, though the neſt of a ſtraggling curlew, or a ſnipe, is ſometimes found in our marſhes. They viſit us in the beginning of winter, and forſake us in the ſpring. They then retire to the mountains of Sweden, Poland, Pruſſia, and Lapland, to breed. Our country, during the ſummer ſeaſon, becomes uninhabitable to them. The ground parched up by the heat, the ſprings dried away, and the vermicular inſects already upon the wing, they have no means of ſubſiſting. Their weak and delicately-pointed bills are unfit to dig into a reſiſting ſoil; and their prey is departed, though they were able to reach its retreats. Thus, that ſeaſon when nature is ſaid to teem with life, and to put on her gayeſt liveries, is to them an interval of ſterility and famine.

The lapwing, the ruff, the red-ſhank, the ſand-piper, the oyſter catcher, and the ringed plover, breed in this country, and, for the moſt part, reſide here. In ſummer, they frequent ſuch marſhes as are not dried up in any part of the year; the Eſſex hundreds, and the fens of Lincolnſhire. There, in ſolitudes formed by ſurrounding marſhes, they breed and bring up their young. In winter, they come down from their retreats, rendered uninhabitable by the flooding of the waters, and ſeek their food about our ditches and marſhy meadow-grounds. Yet, even of this claſs, all are wanderers upon ſome occaſions, and take wing to the northern climates, to breed, and find ſubſiſtence. This happens when our ſummers are peculiarly dry, and when the fenny countries are not ſufficiently watered to defend their retreats.

As all theſe birds run and feed upon the ground, ſo they are all found to neſtle there. The number of eggs generally to be ſeen in every neſt, is from two to four; never under, and very ſeldom exceeding. The neſt is made without any art; but the eggs are either laid in ſome little depreſſion of the earth, or on a few bents and long graſs, that ſcarcely preſerve them from the moiſture below.

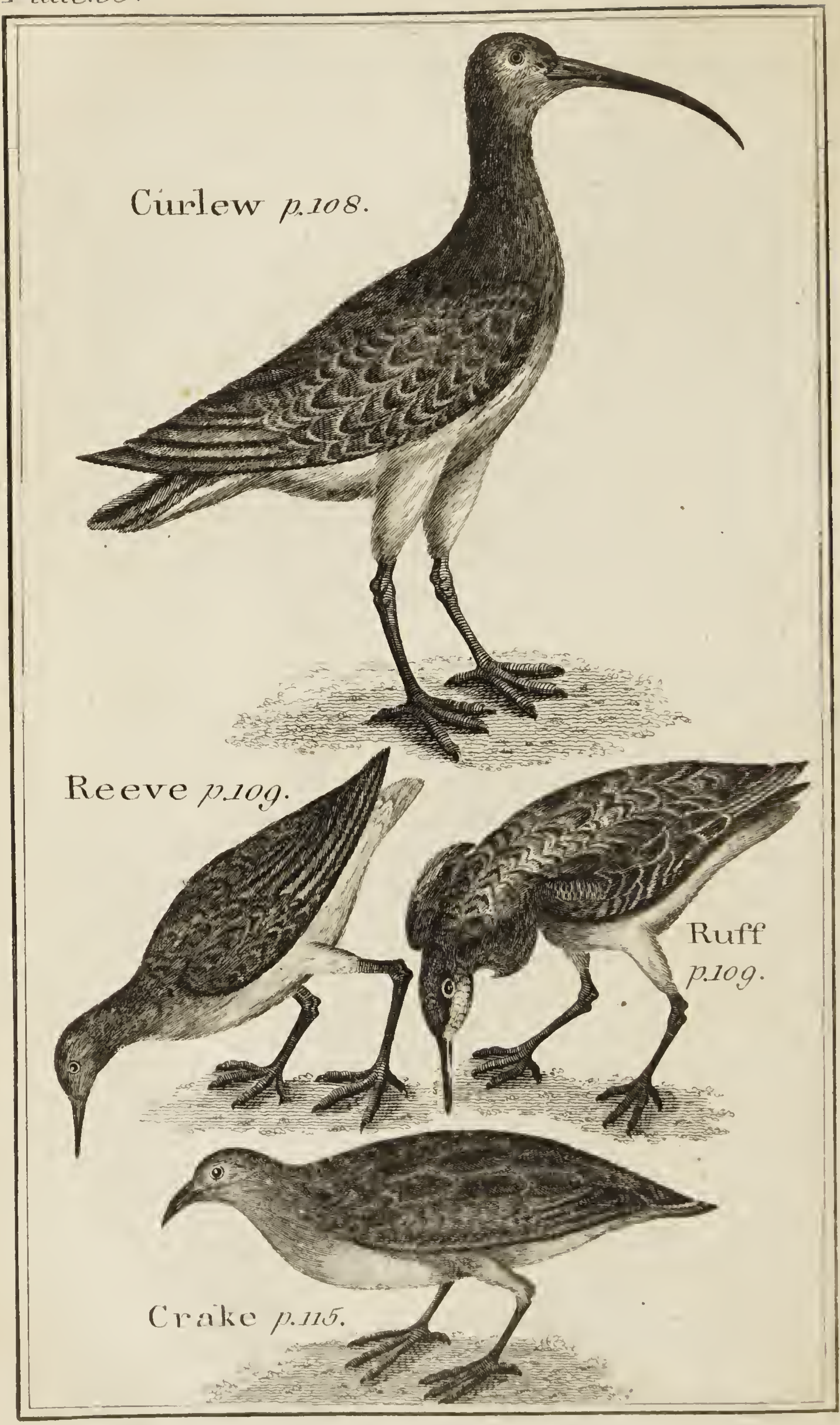
The place theſe birds chiefly chooſe to breed in, is in ſome iſland ſurrounded with ſedgy moors, where men ſeldom reſort; and in ſuch ſituations we have often ſeen the ground ſo ſtrewed with eggs and neſts, that one could ſcarce take a ſtep without treading upon ſome of them. The arts of the lapwing to allure men or dogs from her neſt, are perfectly amuſing. When ſhe perceives the enemy approacing, ſhe never waits till they arrive at her neſt, but boldly runs to meet them. When ſhe has come as near them as ſhe dares to venture, ſhe then riſes with a loud ſcreaming before them, ſeeming as if ſhe were juſt fluſhed from hatching; while ſhe is then probably a hundred yards from the neſt. Thus ſhe flies, with great clamour and anxiety, whining and ſcreaming round the invaders, ſtriking at them with her wings, and fluttering as if ſhe were wounded.

Only three ſpecies of the Pratincole are known by naturaliſts, with ſome varieties. That which is called the *Auſtrian Pratincole* is the ſize of a blackbird, with a ſhort curved bill. The upper parts of the body are greyiſh brown, and the throat is white, ſurrounded with a black line, which commences at each eye. The tail is forked. It is an inhabitant of Germany, where there is alſo a ſpotted kind. It has been called by foreign naturaliſts the *Sea Partridge*.

Of the Rail there are about twenty-two ſpecies foreign and domeſtic.

The *Water Rail*, or brook ouzle is a bird well-known in theſe parts of Europe. It is a large ſlender bird, with a bill one inch and three quarters long. Its weight is four ounces and a half. The upper parts of the plumage are black, edged with olive brown, the lower parts aſh-coloured. It is generally found on the edges of ponds or brooks well furniſhed with cover. It will ſometimes take the water, where it ſwims tolerably well. This is the only ſpecies which is known in England, and we believe in Europe. The foreign birds of this genus are numerous, and much diverſified in their plumage.

Plate.65.


Curlew *p.108.*
Reeve *p.109.*
Ruff *p.109.*
Crake *p.115.*

THE GALLINULE alſo includes about twenty-two ſpecies, of which only five or ſix are common to Europe and but three are known in Great Britain.

The *Crake* (See pl. LXV.) is a bird well-known in many parts of Great Britain, but it is ſtill more common in Ireland. In ſhape it much reſembles the water-rail, and was once erroneouſly ſuppoſed to be the ſame bird, differing only by a change of colour, at a certain ſeaſon of the year. The bill however in this ſpecies is ſhort and thick, exactly reſembling in ſhape that of the common gallinule or water-hen, from which it however differs, not only in its plumage, which is a reddiſh brown, but in its habits, as it never frequents watry places, but is always found in graſs, corn or furze. With us it is a bird of paſſage, and on its firſt arrival about April, is very lean, not weighing more than ſix ounces; but before its departure it weighs more than eight. The fleſh is good food.

The *common Gallinule* or *Water-hen* weighs fifteen ounces. Its bill is red, and covered at the baſe with a red membrane. The plumage above is ſooty black, beneath aſh-coloured. As the birds of the crane kind are furniſhed with long wings, and eaſily change place, the water-hen, whoſe wings are ſhort, is obliged to reſide entirely near thoſe places where her food lies: ſhe never leaves the ſide of the pond or the river in which ſhe ſeeks for proviſion. She builds her neſt upon low trees and ſhrubs, of ſticks and fibres, by the water ſide. She lays twice or thrice in a ſummer. Her young ones ſwim the moment they leave the egg, purſue the parent, and imitate all her manners. She rears, in this manner, two or three broods in a ſeaſon; and when the young are grown up, ſhe drives them off, to ſhift for themſelves.

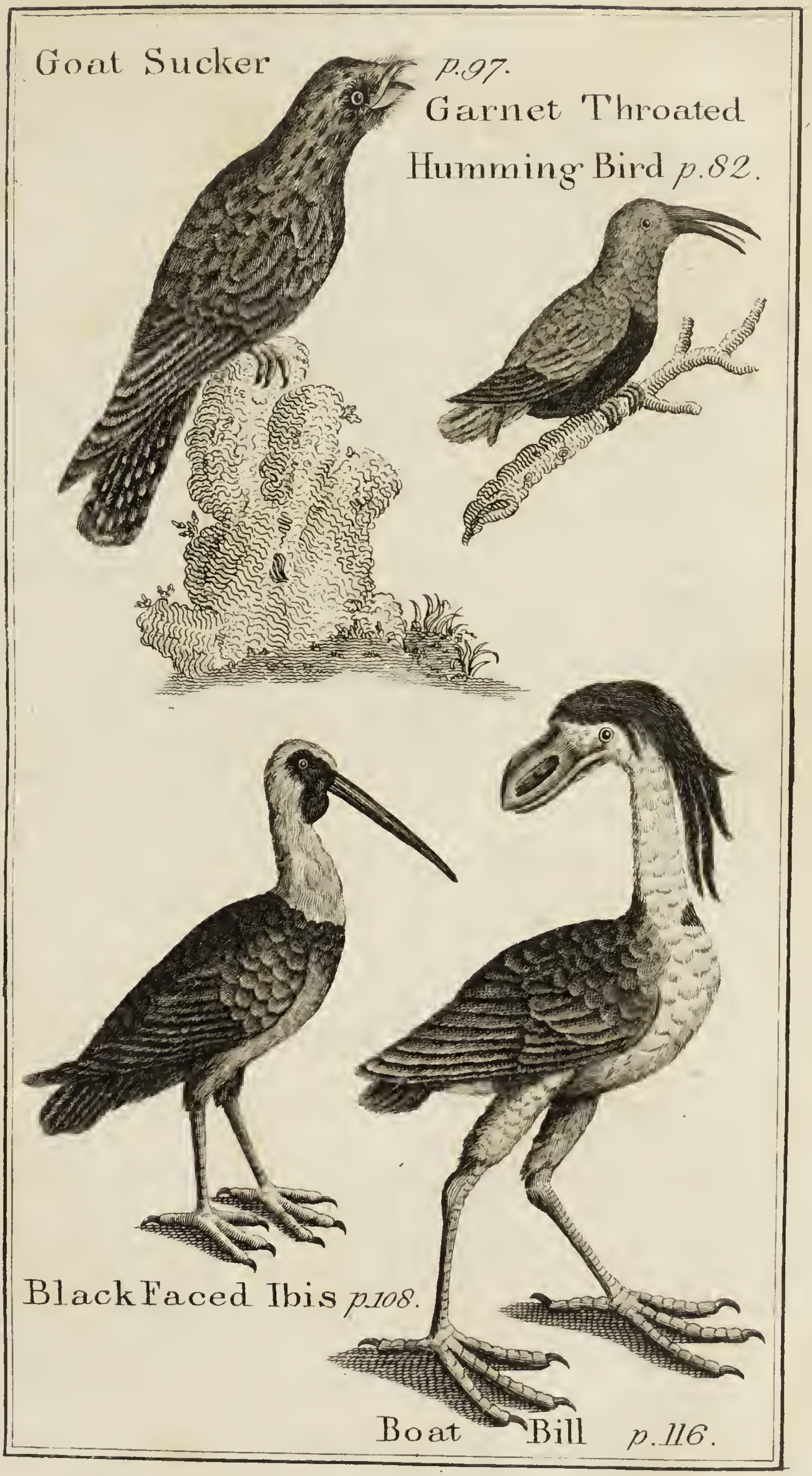
The *ſpotted Gallinule* is a leſs common bird; and in Ruſſia and ſome other parts of Europe a ſpecies is found, which, from its colour, is called the *purple Gallinule*, and which is the ſize of a common fowl.

Of the foreign birds of this order, it is proper to mention the JABIRU of India and of Braſil. Of theſe great birds we know but little, except the general outline of their figure, and the enormous bills which we often ſee preſerved in the cabinets of the curious. The bill of the latter is red, and thirteen inches long: the bill of the former is of a duſky colour. Neither of them, however, are of a ſize proportioned to their immoderate length of bill. The jabiru of Braſil is in length about ſix feet. They are both covered with white feathers, except the head and neck, that are naked; and their principal difference is in the ſize of the body and the make of the bill; the lower chap of the jabiru of Braſil being broad, andbending upwards.

A bird ſtill more extraordinary is included in this order, called the ANHIMA OR SCREAMER, and like the former, a native of Braſil. This is a water-fowl of the rapacious kind, and bigger than a ſwan. The head, which is ſmall for the ſize of the body, bears a black bill, which is not above two inches long; but what diſtinguiſhes it in particular is a horn growing from the forehead as long as the bill, and bending forward like that of the fabulous unicorn of the ancients. This horn is not much thicker than a crow-quill, as round as if it were turned in a lathe, and of an ivory colour. But this is not the only inſtrument of battle this formidable bird carries; it ſeems to be armed at all points; for at the fore-part of each wing. at the ſecond joint, ſpring two ſtraight triangular ſpurs, about as thick as one's little finger: the foremoſt of theſe goads or ſpurs is above an inch long; the hinder is ſhorter, and both of a duſky colour. The claws alſo are long and ſharp; the colour is black and white; and they cry terribly loud. They are never found alone, but always in pairs; the cock and hen prowl together; and their fidelity is ſaid to be ſuch, that when one dies, the other never departs from the carcaſe, but dies with its companion. It makes its neſt of clay, near the bodies of trees, upon the ground, of the ſhape of an oven. There is another ſpecies of Screamer which is creſted and without the horn.

THE BOATBILL is alſo a native of America. That which is repreſented in plate LXI. is about the ſize of a common fowl. The general colour of the bill is duſky, and the ſkin beneath the under jaw is capable of diſtention. From the hind head ſprings a long black creſt. The plumage on the forehead is white, and the reſt of the bird is a pale blueiſh aſh-colour; and the feathers which hang over the breaſt, are looſe, like thoſe of the heron. There are varieties of this bird, both ſpotted and brown, but they appear ſimple varieties, and not at all entitled to the denomination of ſpecies. Like the kings-fiſher, it preys upon fiſh, by perching on trees which over-hang the ſtreams, and dropping on the fiſh as they ſwim by it.

Plate.61.


Goat Sucker *p.97.*
Garnet Throated Humming Bird *p.82.*
Black Faced Ibis *p.108.*
Boat Bill *p.116.*

THE UMBRE (See pl. LXII.) is the ſize of a crow, and not much differing in colour, as it is of a deep brown, or umbre. The bill is three inches and a half in length, with a furrow on each ſide the upper mandible, and from the head ſprings a large creſt of looſe feathers, better than four inches in length. The bird now deſcribed came from the cape of Good Hope. We know of but one ſpecies.

THE JACANA (See pl. LXIV.) is found in moſt of the tropical climates, but is moſt common in South America. It is remarkable for the length of its toes, and for the wings being armed in front with ſharp ſpurs. There are about ten ſpecies differing in ſize from that of a common fowl to that of a water-rail. They vary alſo in their plumage, ſome being brown, ſome black, and ſome variable. The *faithful Jacana* is a moſt uſeful bird at Carthagena in South America. The natives, who keep poultry in great numbers, have one of theſe tame, who attends the flock as a ſhepherd, to defend them from birds of prey. Though not larger than a dunghill cock, the Jacana is able, by means of the ſpurs on his wings, to keep off birds as large as the carrion vulture, and even that bird himſelf; and it never deſerts its charge, but aſſiduouſly takes care to bring the whole flock home ſafe at night. It feeds on vegetables, and cannot run but by the help of its wings.

THE SHEATHBILL is an inhabitant of New Zealand, and is remarkable for a horny ſheath which covers the upper part of its bill, which is alſo moveable, and may be raiſed upwards or laid flat on the bill. We know of but one ſpecies, which is as large as a pigeon, and as white as ſnow. They feed on ſhell fiſh and carrion.

Water-Fowl with pinnated (or *finned) feet.*

Of this deſcription of birds we know only three kinds. Their general characteriſtic is that of having their toes furniſhed with jagged or ſcolloped membranes, which probably may aſſiſt them in ſwimming. They appear indeed in every reſpect an intermediate race between the tall and ſlender birds of the crane form, and the common web-footed water-fowl.

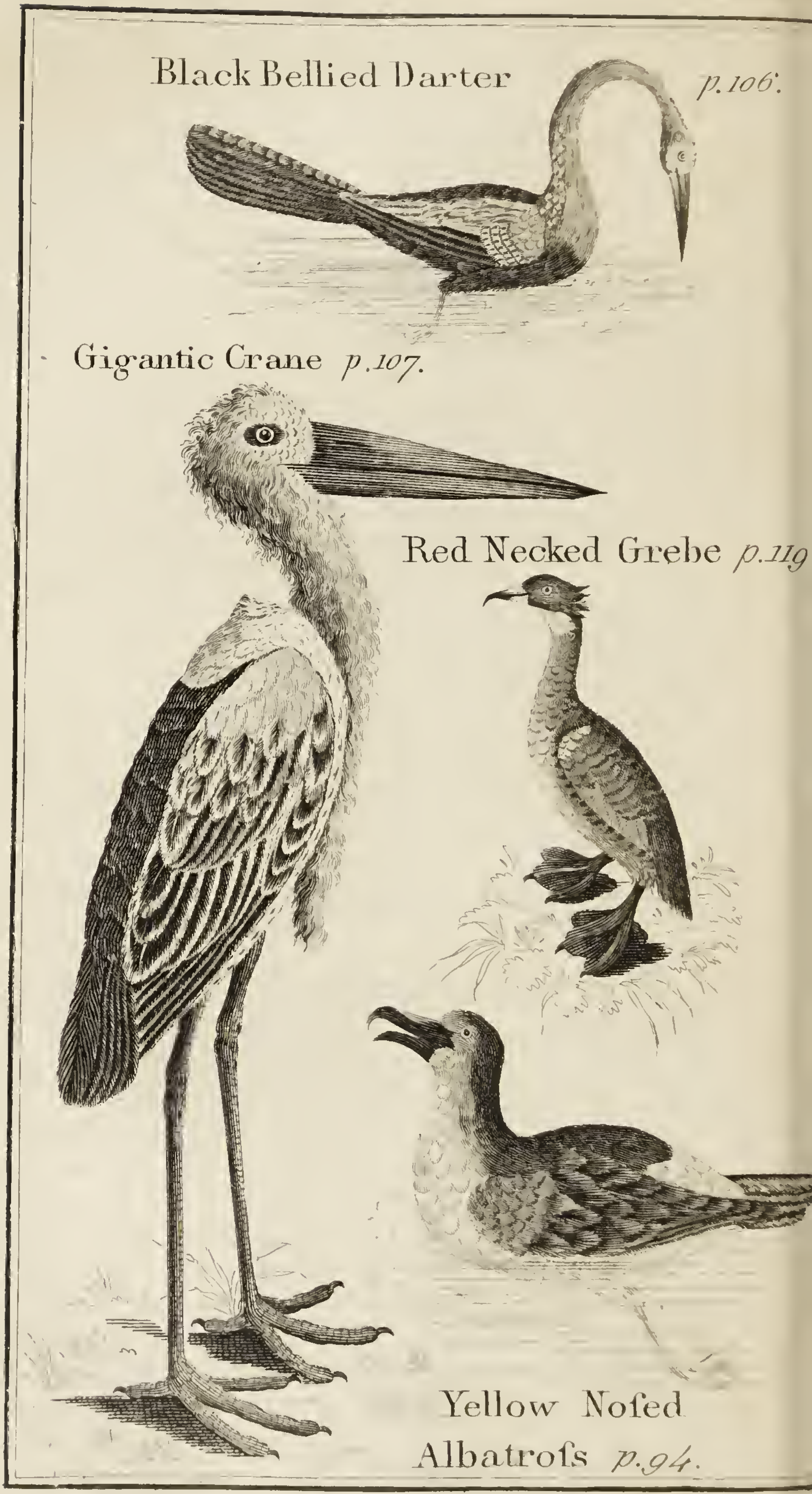
THE PHALAROPE is in every reſpect but the above characteriſtic, formed like the Sandpiper. It is the ſize of the purro, and weighs one ounce. The *grey Phalarope* has the upper parts of the plumage aſh-coloured, varied a little with duſky and white, and the breaſt and belly white. The *Red Phalarope* only differs from it in having the upper parts of the plumage of a deep lead colour, ſtriped with duſky yellow; and the under parts of a duſky red. Theſe are ſometimes found in England, and there are about three foreign ſpecies.

THE COOT is a well-known bird. It weighs from twenty-four to twenty-eight ounces. The bald part of the head, which in the water-hen is red, in the coot is white. The upper parts of its plumage are black, the breaſt and belly white. As the coot is a larger bird than the water-hen, which it much reſembles, it is always ſeen in larger ſtreams, and more remote from mankind. It there makes a neſt of ſuch weeds as the ſtream ſupplies, and lays them among the reeds, floating on the ſurface, and riſing and falling with the water. The reeds among which it is built, keep it faſt; ſo that it is ſeldom waſhed into the middle of the ſtream. But if this happens, which is ſometimes the caſe, the birds ſits in her neſt, like a mariner in his boat, and ſteers, with her legs, her cargo into the neareſt harbour: there, having attained her port, ſhe continues to ſit in great tranquillity, regardleſs of the impetuoſity of the current; and, though the water penetrates her neſt, ſhe hatches her eggs in that wet condition. In Madagaſcar there is a coot with a red comb like a cock.

To theſe birds with long legs and finny toes, we will add one genus more, with ſhort legs and finny toes: viz. the GREBE (See pl. LXIX.) It is much larger than either of the former, and its plumage white and black. It differs alſo entirely in the ſhortneſs of its legs, which are made for ſwimming, and not walking: in fact, they are, from the knee upward, hid in the belly of the bird, and have conſequently very little motion. By this mark, and by the ſcolloped fringe of the toes, this bird may be eaſily diſtinguiſhed from all others.

As they are thus, from the ſhortneſs of their wings, ill formed for flying, and, from the uncommon ſhortneſs of their legs, utterly unfitted for walking, they ſeldom leave the water, and chiefly frequent thoſe broad, ſhallow pools where their faculty of ſwimming can be turned to the greateſt advantage, in fiſhing and ſeeking their prey.

Plate .



Black Bellied Darter *p.106.*

Gigantic Crane *p.107.*

Red Necked Grebe *p.119*

Yellow Noſed
Albatroſs *p.94.*

They are chiefly, in England, ſeen to frequent the meres of Shropſhire and Cheſhire; where they breed among reeds and flags, in a floating neſt. It is never ſeen on land; and, though diſturbed ever ſo often, will not leave that lake where alone, by diving and ſwimming, it can find food and ſecurity. It is chiefly ſought for the ſkin of its breaſt, the plumage of which is of a moſt beautiful ſilvery white, and as gloſſy as ſatin.

Of the grebe kind there are about thirteen ſpecies. The moſt common is the *creſted grebe.* In pl. LXXII. is delineated the *Eared Grebe*, which is the ſize of a teal, and is diſtinguiſhed by a tuft of orange-coloured feathers, which ſpring from behind each eye; it is a native of Siberia; and in plate LXVI. is a ſtill more beautiful ſpecies, viz. the *red-necked grebe*; the chin of which is pale aſh-colour, the reſt of the neck of a reddiſh cheſnut.

CHAP.

CHAP. XXVIII.

Of web-footed water-fowl—The Avoset*—Scooping, American and White Avoſet—The* Courier*—The* Flamingo*—The* Ank*—The Great Ank—The Razor-bill—The Puffin—The Little Ank—The Tufted and Creſted Ank, &c.—The* Guillemot*——The Fooliſh, Leſſer, and Marbled Guillemot — The* Diver *— The Northern, Speckled Black and Red-throated Diver—The Chineſe Diver—The* Tern*—The Great, Leſſer, Black, and Striated Tern—The Noddy—The* Petrel*—The Fulmar—The Shearwater—The Stormy Petrel—The Giant Petrel—The* Gull*—The Black-backed, Skua, Wagel, Herring-gulls, &c.—The Kittiwake—The Common Gull—The Black-cap, &c.—Modes of taking Sea-fowl—The* Merganser*—The Gooſeander—The Dun-diver—The Smew—The Hooded Merganſer—The* Duck*—The Swan—The Gooſe—The Bean Gooſe—The Barnacle—The Brent Gooſe—The Mallard—The Eider Duck—The Velvet, Scoter, Tufted and Scaup Duck—The Golden Eye—The Shoveller—The Pintail—The Pochard—The Long-tailed Duck—The Wigeon—The Teal—The Muſcovy, Braſilian, American, and Chineſe Ducks—Decoy for Ducks—The* Pelican*—The Frigate-Pelican, or Man-of-War Bird—The Corvorant—The Shag—The Gannet, or Soland Gooſe—The Booby—The* Albatross*—The Yellow-noſed Albatroſs—The* Skimmer*—The* Penguin*—The Patagonian Penguin—The Magellanic Penguin—The* Tropic Bird*—The* Darter*—The White and Black-bellied Darters.*

OF the web-footed water-fowl, the few which are diſtinguiſhed by the name of *long-legged* have ſo near an affinity with the birds of the preceding order, that ſome naturaliſts have claſſed them among the cranes, or waders, and, indeed, were it not for the very accurate diſtinction which the form of the foot affords, analogy would direct us to this arrangement, in preference to every other.

The Avoset is eaſily diſtinguiſhed from all other birds by the form of its bill, which is very thin, ſlender, and bends conſiderably upwards. The *Scooping Avoſet* (See pl. LXVII.) is about the ſize of the lapwing, or eighteen inches long; the bill is three inches and an half in length. The top of the head is black, the reſt of the head, neck,

and

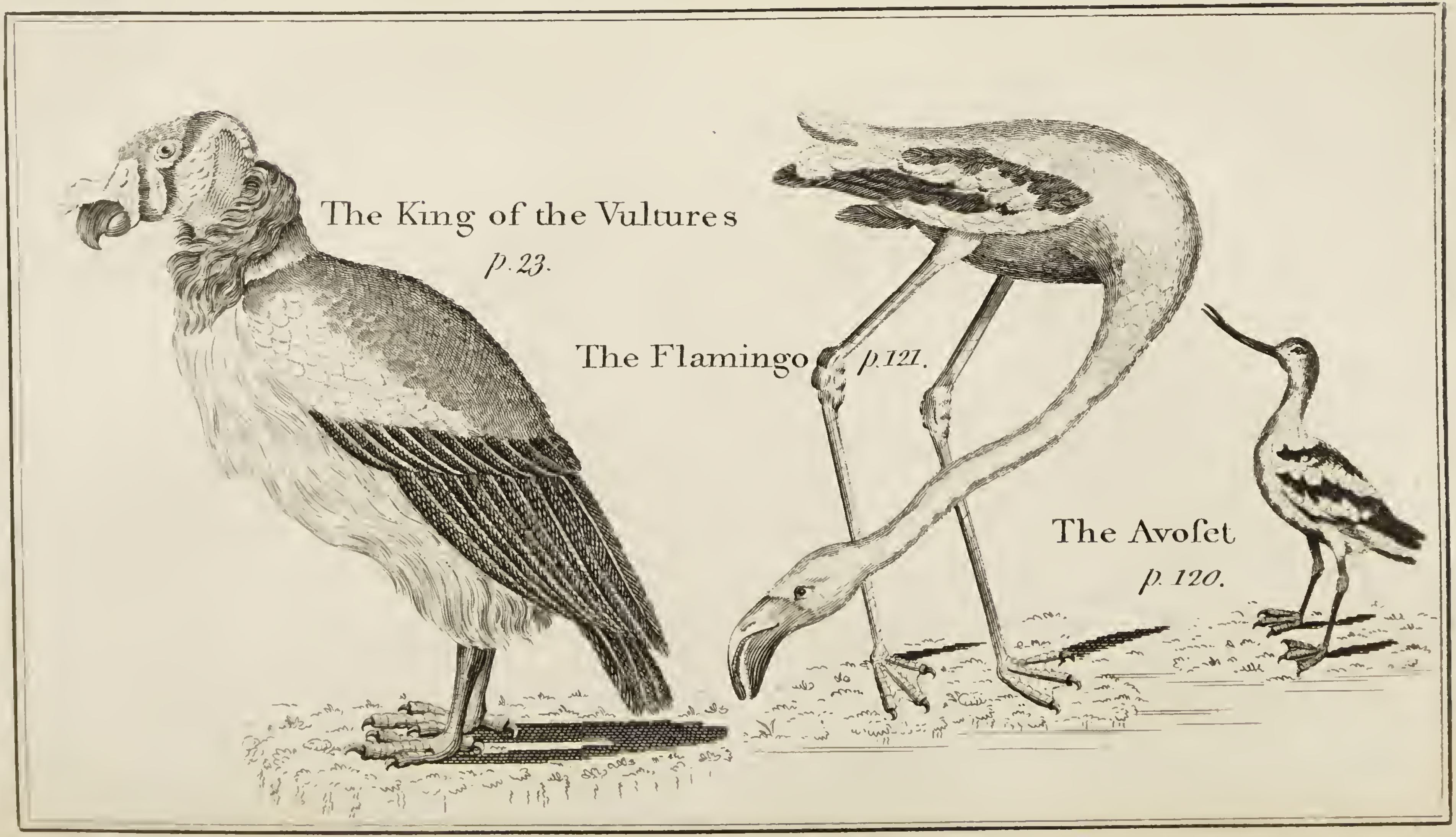

The King of the Vultures
p. 23.
The Flamingo p. 121.
The Avoſet
p. 120.

Plate. 67.

and all the other parts of the body white, except the inner ſcapulars, the middle of the wing coverts and outer webs, and ends of the quills, which again are black. It weighs about thirteen ounces, and is frequent in the winter, on moſt of the ſea-coaſts of Europe, as well as in the Fens of Lincolnſhire, Cambridge, &c. It feeds on worms and inſects, which it ſcoops out of the ſand with its bill. The *American Avoſet* differs only in being ſomething larger, and having the neck and breaſt of a deep cream-colour. In Hudſon's Bay there is a *White Avoſet*.

THE COURIER is an Italian bird, ſomewhat leſs than the avoſet, the bill is ſhorter, ſtrait and yellow. The upper parts of the plumage of a ruſty-brown, the under parts white. It is remarkable for its ſwiftneſs in running, from which property it derives its name.

THE FLAMINGO (See pl. LXVII.) is, perhaps, the moſt remarkable of water-fowl; it is one of the talleſt, and the moſt beautiful. The body, which is of a beautiful ſcarlet, is no bigger than that of a ſwan; but its legs and neck are of ſuch an extraordinary length, that when it ſtands erect, it is ſix feet ſix inches high. Its wings, extended, are five feet ſix inches from tip to tip; and it is four feet eight inches from tip to tail. The head is round and ſmall, with a large bill, ſeven inches long, partly red, partly black, and crooked like a bow. The legs and thighs, which are not much thicker than a man's finger, are about two feet eight inches high; and its neck near three feet long. The feet are feeble, and united by membranes, as in thoſe of the gooſe. Of what uſe theſe membranes are, does not appear, as the bird is never ſeen ſwimming, its legs and thighs being ſufficient for bearing it into thoſe depths where it ſeeks for prey.

This extraordinary bird is now chiefly found in America, but was once known on all the coaſts of Europe. Its beauty, its ſize, and the peculiar delicacy of its fleſh, have been ſuch temptations to deſtroy or take it, that it has long ſince deſerted the ſhores frequented by man, and taken refuge in countries that are as yet but thinly peopled.

When the Europeans firſt came to America, and coaſted down along the African ſhores, they found the flamingos on ſeveral ſhores on either continent, gentle, and no way diſtruſtful of mankind. When the fowler had killed one, the reſt of the flock, far from attempting to fly, only regarded the fall of their companion in a kind of fixed aſtoniſhment:

another and another ſhot was diſcharged; and thus the fowler often levelled the whole flock, before one of them began to think of eſcaping.

But at preſent it is very different in that part of the world; and the flamingo is not only one of the ſcarceſt but of the ſhyeſt birds in the world, and the moſt difficult of approach. They chiefly keep near the moſt deſerted and inhoſpitable ſhores; near ſalt-water lakes and ſwampy iſlands. When ſeen by mariners in the day, they always appear drawn up in a long cloſe line of two or three hundred together; and, as Dampier tells us, preſent, at the diſtance of half a mile, the exact repreſentation of a long brick wall. Their rank, however, is broken when they ſeek for food; but they always appoint one of the number as a watch, whoſe only employment is to obſerve and give notice of danger, while the reſt are feeding. As ſoon as this truſty centinel perceives the remoteſt appearance of danger, he gives a loud ſcream, with a voice as ſhrill as a trumpet, and inſtantly the whole cohort are upon the wing. The fleſh of the old ones is black and hard; though, Dampier ſays, well taſted: that of the young ones is better. But, of all delicacies, the flamingo's tongue is the moſt celebrated. In fact, the Roman Emperors conſidered them as the higheſt luxury; and we have an account of one of them, who procured fifteen hundred flamingos' tongues to be ſerved up in a ſingle diſh. The tongue of this bird, which is ſo much ſought after, is a good deal larger than that of any other bird whatever. The bill of the flamingo is like a large black box, of an irregular figure, and filled with a tongue which is black and griſtly.

Their time of breeding is according to the climate in which they reſide: in North America they breed in our ſummer; on the other ſide the line they take the moſt favourable ſeaſon of the year. They build their neſts in extenſive marſhes, and where they are in no danger of a ſurprize. The neſt is not leſs curious than the animal that builds it: it is raiſed from the ſurface of the pool about a foot and an half, formed of mud, ſcraped up together, and hardened by the ſun, or the heat of the bird's body: it reſembles a truncated cone, or one of the pots which we ſee placed on chimnies; on the top it is hollowed out to the ſhape of the bird, and in that cavity the female lays her eggs, without any lining but the well cemented mud that forms the ſides of the building. She always lays two eggs, and no more; and, as her legs are immoderately long, ſhe ſtraddles on the neſt, while her legs hang down, one on each ſide into the water. The young ones are a long while before they are able to fly; but they run with amazing ſwiftneſs. They are ſometimes caught; and, very different from the old ones, ſuffer themſelves to be carried home, and are tamed very eaſily.

The firſt European bird of the web-footed fowls with ſhort legs, which naturaliſts introduce to our notice is the AUK, of which there are about twelve ſpecies foreign and domeſtick. The whole tribe is diſtinguiſhed peculiarly by the form of the bill, which is ſtrong, convex, compreſſed at the ſides, in general croſſed with ſeveral furrows, and in ſome degree reſembling the coulter of a plough.

The *Great Auk* (See pl. LXXI.) is the ſize of a gooſe; its bill is black, about four inches and a quarter in length, and covered at the baſe with ſhort velvet-like feathers. The upper parts of the plumage are black, and the lower parts white, with a ſpot of white between the bill and the eyes, and an oblong ſtripe of the ſame on the wings, which are too ſhort for flight. The bird is alſo a very bad walker, but ſwims and dives well. It is however obſerved by ſeamen, that it is never ſeen out of ſoundings, ſo that its appearance ſerves as an infallible direction to land. It feeds on the lump-fiſh and others of the ſame ſize; and is frequent on the coaſts of Norway, Greenland, Newfoundland, &c. It lays its eggs cloſe to the ſea mark.

The *Razor-bill* is not above half the ſize of the preceding, which it reſembles both in form and plumage, except that it has the uſe of its wings, and lays its egg, (for each of theſe ſpecies lay but one) on the bare top of a precipice, and faſtens it by a cement ſo as to prevent its rolling off. It is pretty common on the coaſts of England during the ſummer ſeaſon. The *black-billed auk* is ſtill ſmaller.

The *Puffin* (See pl. LXIX.) is the ſize of the teal, weighs about twelve ounces, and is twelve inches in length. The bill is much compreſſed; the half next the point is red, that next the baſe blue grey. It has three furrows or grooves impreſſed in it; one in the livid part, two in the red. The eyes are fenced with a protuberant ſkin, of a livid colour; and they are grey or aſh-coloured.

The puffin, like all the reſt of this kind, has its legs thrown ſo far back, that it can hardly move without tumbling. This makes it riſe with difficulty, and ſubject to many falls before it gets upon the wing; but as it is a ſmall bird, when it once riſes, it can continue its flight with great celerity.

All the winter theſe birds are abſent, viſiting regions too remote for diſcovery. At the latter end of March, or the beginning of April, come over a troop of their ſpies or harbingers, that ſtay two or three days, as it were to view and ſearch out for their former ſituations, and ſee whether all be well. This done, they once more depart; and, about the beginning of May, return again with the whole army of their companions. But if the ſeaſon happens to be ſtormy and tempeſtuous, and the ſea troubled, the unfortunate voyagers undergo incredible hardſhips; and they are found, by hundreds, caſt away upon the ſhores, lean and periſhed with famine.

The puffin, when it prepares for breeding, which always happens a few days after its arrival, begins to ſcrape out an hole in the ground not far from the ſhore; and when it has ſome way penetrated the earth, it then throws itſelf upon its back, and with its bill and claws thus burrows inward, till it has dug a hole with ſeveral windings and turnings, from eight to ten feet deep. It particularly ſeeks to dig under a ſtone, where it expects the greateſt ſecurity. In this fortified retreat it lays one egg; which, though the bird be not much bigger than a pigeon, is of the ſize of a hen's.

Few birds or beaſts will venture to attack them in their retreats. When the great ſea-raven comes to take away their young, the puffins boldly oppoſe him. Their meeting affords a moſt ſingular combat. As ſoon as the raven approaches, the puffin catches him under the throat with its beak, and ſticks its claws into its breaſt, which makes the raven, with a loud ſcreaming, attempt to get away; but the little bird ſtill holds faſt to the invader, nor lets him go till they both come to the ſea, where they drop down together, and the raven is drowned: yet the raven is but too often ſucceſsful; and invading the puffin at the bottom of its hole, devours both the parent and its family.

The *little auk* (See pl. LXXI.) is ſtill leſs than the puffin, being not above the ſize of a blackbird.

Of the foregn birds of this genus, the *tufted auk* is one of the moſt curious. It is ſomewhat bigger than the puffin, and is diſtinguiſhed by a tuft of feathers four inches in length, which ariſes over each eye, and falls elegantly on each ſide of the neck. It is found at Kamſchatka.

The *creſted ank* is perhaps ſtill more remarkable, having its head adorned with a creſt, compoſed of long feathers, and which curves forward over the bill. This bird inhabits the iſlands contiguous to Japan. Beſides theſe, there are the *parroquet* and *duſky ank*, and ſome other ſpecies of leſs note.

THE GUILLEMOT is nearly allied to the preceding genus, but it wants the characteriſtic bill, which in this genus, is ſlender, ſtrong and pointed.

The largeſt ſpecies with which we are acquainted is the *Fooliſh Guillemot*, which weighs about twenty-four ounces, and is ſeventeen inches in length. The bill is black, and three inches in length. The head, neck, back, wings and tail are of a deep mouſe colour; the tips of the leſſer quill feathers, and all the under parts of the plumage are white. They accompany the ank in its viſits to our ſhores, and are ſuch fooliſh birds, that they will not quit the rock, though they ſee their companions killed around them.

The *leſſer guillemot* weighs about fifteen ounces. The upper parts of its plumage are darker than in the former ſpecies. The *black guillemot* is entirely black, except a large mark of white on the wings. In winter, however, this bird is ſaid to change to white; and there is a variety in Scotland not uncommon, which is ſpotted, and which Mr. Edwards has deſcribed under the name of the ſpotted Greenland dove. The *marbled guillemot*, which is found at Kamſchatka, &c. receives its name from its plumage, which is duſky, elegantly marbled with white.

THE DIVER genus includes about ſeven ſpecies foreign and domeſtic. The great *northern diver* weighs ſixteen pounds, and meaſures three feet ſix inches in length. The bill is ſtrong, black, and above four inches in length. The head and neck are velvet-black, with a white creſcent immediately under the throat, and another behind. The upper parts of the plumage are alſo black, ſpotted with white, and the breaſt and belly perfectly white. This bird is found in all the northern parts of Europe, and feeds on fiſh. It flies high and well. The *Imber* is leſs than the preceding, but ſtill larger than a gooſe. The upper parts of the plumage are in general duſky; the under parts ſilvery white. It is very common in the Orknies. The skins of both theſe ſpecies are ſo remarkably tough, that in ſome of the northern countries they have been uſed as leather.

The *ſpeckled diver* is more common in the ſouthern parts of Europe. It is called on the Thames the *ſprat loon.* It weighs about two pounds and a half; and has the upper parts of the body dusky ſpotted with white, the breaſt and belly white. It is ſo confident of its skill in diving, that it often approaches very near the boats when fiſhing for ſprats or herrings. The *black-throated diver* has the fore part of the throat black, the back and wings of the ſame colour ſpotted with white; the head and neck aſh-colour, and the breaſt and belly white. This bird is common in the northern regions, but ſeldom found in France or England.

The *red throated diver* (See pl. LXXI.) differs chiefly from the preceding in having the throat and part of the neck of a fine red; the upper parts of the body alſo are dusky, marked with a few white ſpots. It is ſeldom found to the ſouth of Scotland.

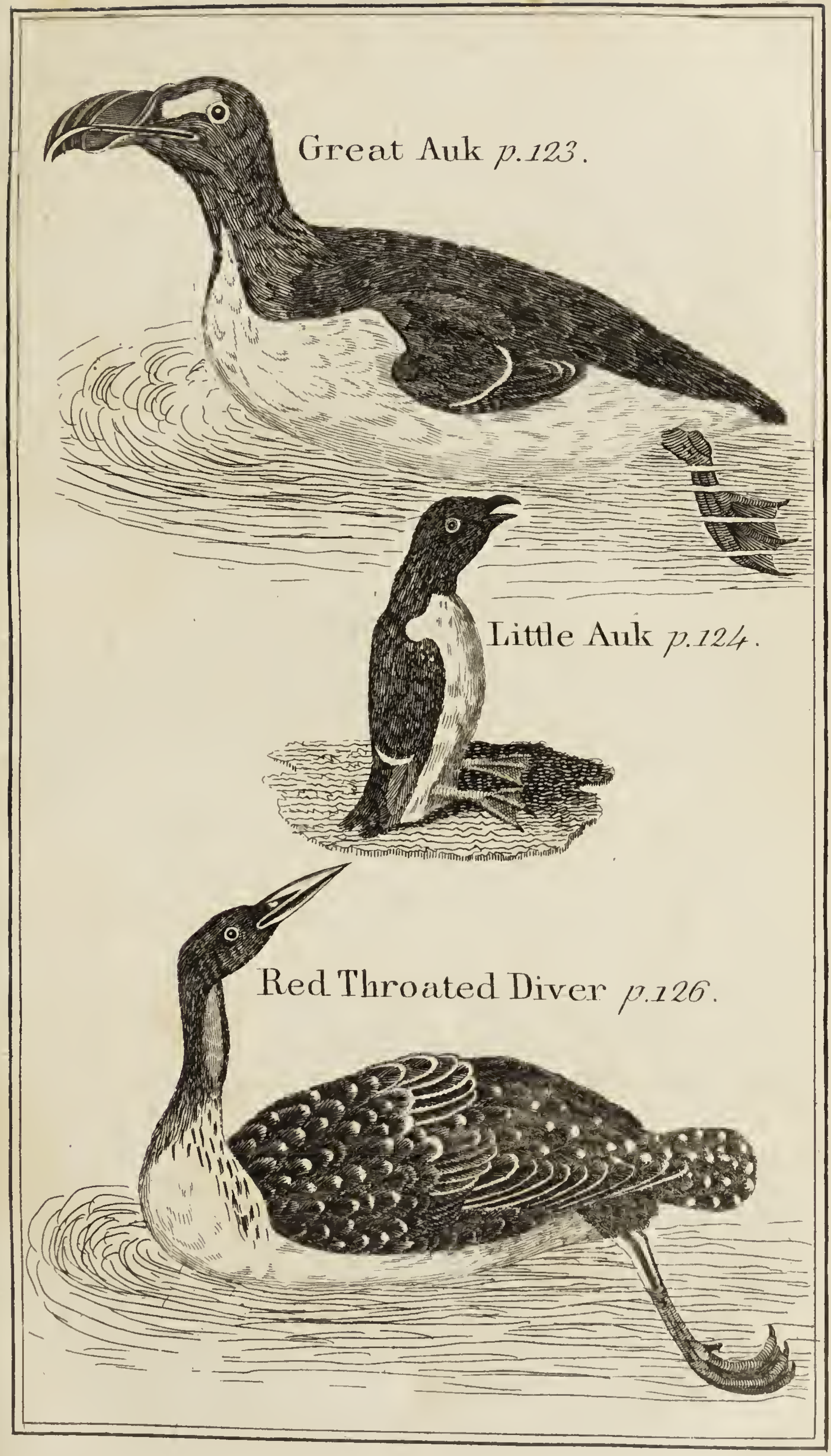
Of the foreign birds of this ſpecies, the *Chineſe Diver* is the only animal worth notice. The upper parts of the plumage are of a greeniſh brown; the under parts a reddiſh white, marked with dark ſpots. This is generally ſuppoſed to be one of the birds which the Chineſe train up for the purpoſe of fiſhing, of which we ſhall have occaſion to treat further when we ſpeak of the corvorant.

Of the Tern there are about twenty-three different ſpecies, which are all diſtinguiſhed by one common characteriſtic, viz. the forked tail.

The *great tern* (See pl. LXXIV.) is about fourteen inches long, and weighs four ounces and a quarter. The bill and feet are a fine crimſon, the former is tipt with black, and very ſlender. The back of the head is black; the upper part of the body a pale grey: and the under part white. Theſe birds have been called ſea ſwallows, as they appear to have all the ſame actions at ſea that the ſwallow has at land, ſeizing every inſect which appears on the ſurface, and darting down upon the ſmaller fiſhes, which they ſeize with incredible rapidity.

The *leſſer tern* weighs only two ounces five grains. The bill is yellow, and from the eyes to the bill is a black line. In other reſpects it almoſt exactly reſembles the preceding.

Plate. 71.



Great Auk *p.123.*

Little Auk *p.124.*

Red Throated Diver *p.126.*

The *black tern* is of a middle ſize between the two preceding ſpecies. It weighs two ounces and a half. It receives its name from being all black as far as the vent, except a ſpot of white under the throat. This bird is called about Cambridge the *car ſwallow*. It is a very noiſy animal.

Among the foreign birds of the tern genus, there are ſome found of a ſnowy white; but the moſt ſingular bird of the kind is the *ſtriated tern* (See pl. LXX.) which is found at New Zealand. It is thirteen inches in length. The bill is black, and the body in general mottled, or rather ſtriped with black and white. The *noddy* is about fifteen inches long. The bill is black, and two inches long, and the whole plumage a ſooty brown, except the top of the head, which is white. It is a very common bird in the tropical ſeas, where it is known frequently to fly on board ſhips, and is taken with the hand. But though it be thus ſtupid, it bites the fingers ſeverely, ſo as to make it unſafe to hold it. It is ſaid to breed in the Bahama iſlands.

The whole genus of PETRELS are known by having inſtead of a back toe only a ſharp ſpur or nail; they have alſo a faculty of ſpouting from their bills, to a conſiderable diſtance, a large quantity of pure oil, which they do by way of defence, into the face of any perſon who attempts to take them.

The *fulmar* is the largeſt of the kind which is known in theſe climates. It is ſuperior to the ſize of the common gull, being about fifteen inches in length, and in weight ſeventeen ounces. The bill is very ſtrong, yellow, and hooked at the end. The head, neck, and all the under parts of the body are white; the back and wings aſh-coloured, the quills duſky, and the tail white. It feeds on the blubber of whales, which ſupplies the reſervoir, whence it ſpouts, with a conſtant ſtock of ammunition. This oil is eſteemed by the inhabitants of the North as a ſovereign remedy in many complaints both external and internal. The fleſh is alſo conſidered by them as a delicacy, and the bird is therefore in great requeſt at St. Kilda. It is ſaid that when a whale is taken, theſe birds will, in defiance of all endeavours, light upon it, and pick out large lumps of fat even while it is alive.

The *ſhearwater*, or *manks puffin*, as it is called by Willoughby, is ſomething ſmaller than the preceding. The head, and all the upper part of the body, are of a ſooty blackneſs; and the under part and inner coverts of the wings white. Theſe birds are found in the Calf of Man, and the Scilly Iſles. In February they take a ſhort poſſeſſion of the rabbit burrows, and then diſappear till April; they lay one egg, and in a ſhort time the young are fit to be taken. They are then ſalted and barrelled. During the day they keep at ſea fiſhing, and towards evening return to their young, whom they feed by diſcharging the contents of the ſtomach into their mouths.

The *ſtormy petrel* (See pl. LXXIII.) is about the ſize of a houſe ſwallow. The general colour of the plumage is black, except about the rump, which is white. They ſometimes hover over the water like ſwallows, and ſometimes appear to run on the top of it: they are alſo excellent divers. They are very clamorous, and are called by the ſailors *Mother Cary's* chickens, who obſerve that they never ſettle or ſit upon the water, but when ſtormy weather is to be expected. They are found in moſt parts of the world; and in the Ferro iſlands the inhabitants draw a wick through the body of the bird, from the mouth to the rump, which ſerves them as a candle, being fed by the vaſt proportion of oil which this little animal contains.

There are about twenty ſpecies of foreign birds of this kind. In the high ſouthern latitudes one is found, which is the ſize of a gooſe, and on that account called the *giant petrel.* The upper parts of its plumage are pale brown, mottled with duſky white; the under parts are white.

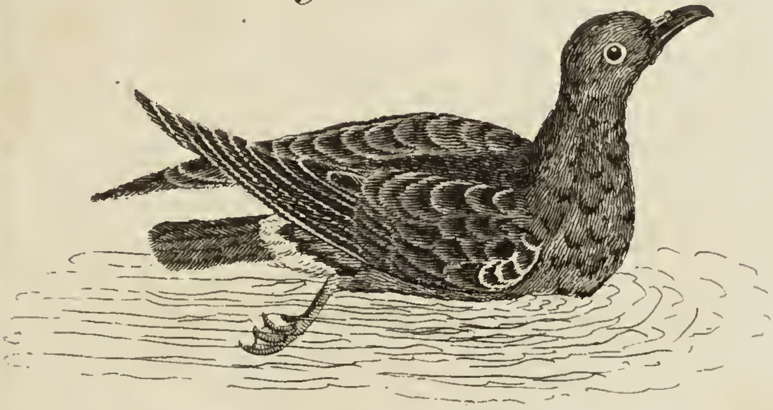
The GULL, and all its varieties, is well known to moſt readers. It is ſeen with a ſlow-ſailing flight hovering over rivers, to prey upon the ſmaller kinds of fiſh; it is ſeen following the plowman in fallow fields to pick up inſects; and when living animal food is not to be found, it has even been known to eat carrion, and whatever elſe offers of the kind.

Of the gull there are about nineteen ſpecies. The largeſt with which we are acquainted is the *black backed gull,* ſo called, becauſe the upper part of the back and wings are black, the reſt of the body being a perfect white. It weighs near five pounds, is twenty-nine inches in length, and in the extent of its wings five feet nine inches. It is common in England, and in all the north of Europe. In America it is called the *old wife.*

The *ſkua gull* is the ſize of a raven. The upper parts of the head, neck, back, and wings are deep brown; the under

Plate.73.

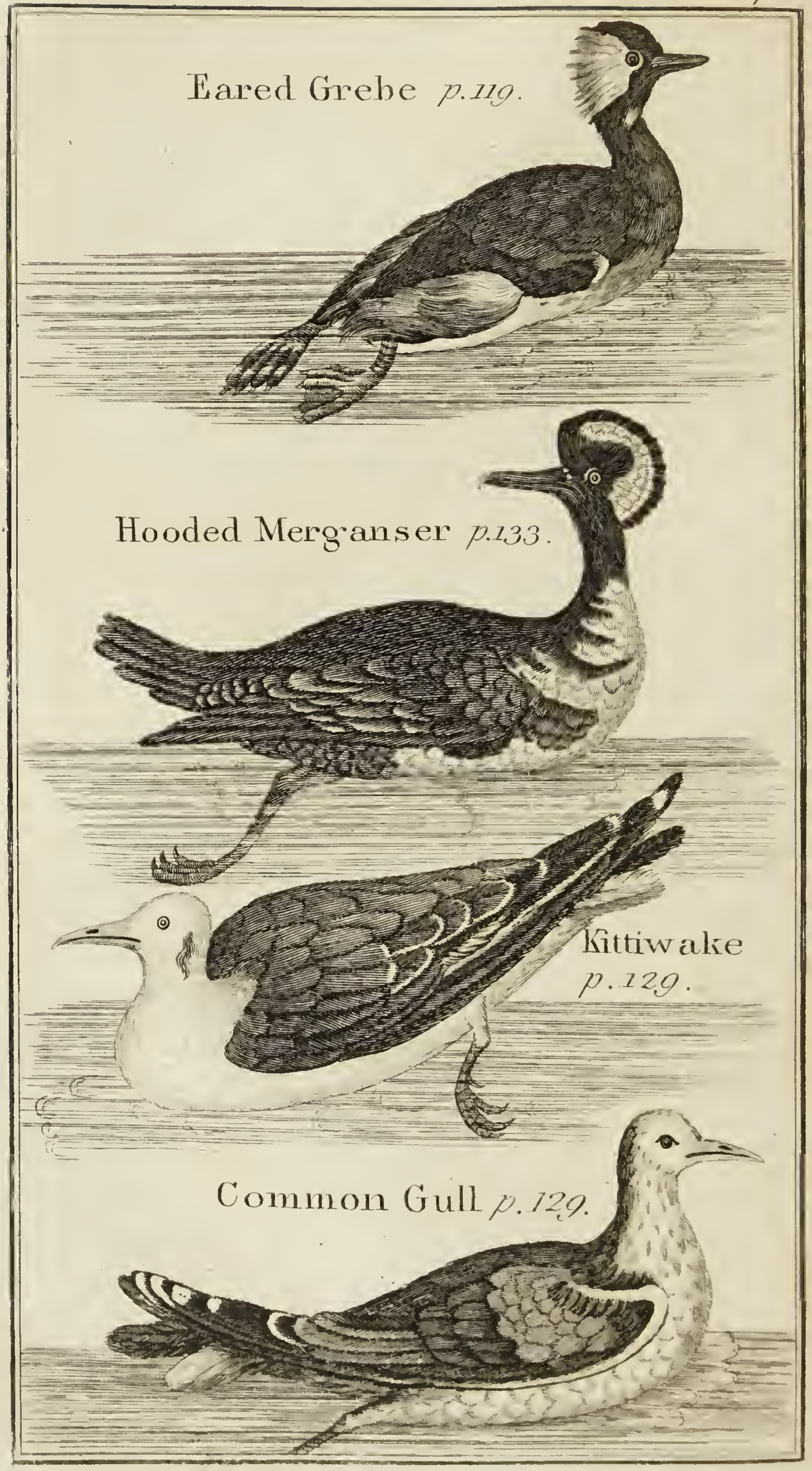
Stormy Petrel *p.128.*



Arctic Gulls *p.129.*

Red Breaſted Merganser *p.132.*

Plate 72.



Eared Grebe *p. 119.*

Hooded Merganser *p. 133.*

Kittiwake *p. 129.*

Common Gull *p. 129.*

under parts a pale, ruſty aſh colour. The legs are black, rough, and warty, and the talons very ſtrong and hooked. It is moſtly a native of the North, though often found in England. It is a moſt formidable bird, as it not only preys upon fiſh, but upon all the ſmaller water-fowl, and even on young lambs. It has the fierceneſs of the eagle in defending its young; and when the inhabitants of the Ferroe iſles attack its neſt, they hold a knife over their heads, on which the ſkua will transfix itſelf in its fall on the invaders. On the rocky iſland of Foula, one of the Shetland iſles, it is a privileged bird, as it is ſaid to defend the flocks from the eagle, which it purſues and beats off with great fury, whenever he preſumes to viſit the iſland.

The *wagel gull* has its whole plumage compoſed of a mixed brown aſh-colour and white. It weighs about three pounds.

The *herring-gull* reſembles the *black-backed* in every thing but ſize, and that the plumage on the back and wings is more inclined to aſh-colour than black; it weighs thirty ounces. The *glacous gull*, which inhabits Norway, &c. is rather larger than the herring gull, but reſembles it in moſt other reſpects; the *ſilvery gull* is the ſame ſize as the herring gull, and not much different in plumage and manners.

The *tarrock*, and the *kittiwake gulls* (See pl. LXXII.) alſo ſo nearly reſemble each other, that ſome authors affirm the latter to be only the tarrock in a ſtate of perfection. The head, neck, belly, and tail of the kittiwake are of a ſnowy whiteneſs, the back and wings are grey; and both ſpecies have behind each ear a dark ſpot; both ſpecies are about the ſame ſize, viz. fourteen inches, and the tarrock weighs ſeven ounces. Of the *arctic gull* (See pl. LXXIII.) the male has the top of the head black; the back, wings, and tail duſky; the reſt of the body white: the female is entirely brown. It has been called the paraſite, from its habits of purſuing the leſſer gulls till they drop their ordure through fear, which this filthy animal catches and devours, before it drops into the water.

The *common gull* (See pl. LXXII.) is ſeventeen inches long, and weighs one pound. The bill is yellow; the back and wings a pale grey, and the head and reſt of the body white. The *winter gull* is alſo very common in all theſe parts of Europe. The top of the head is white, marked with oblong duſky ſpots; the back and wings aſh-colour, marked with duſky brown.

The jelly-like ſubſtance, known by the name of ſtar-ſhot, or ſtar-jelly, owes its origin to ſome of theſe birds, being nothing but the half-digeſted remains of earth-worms, on which they feed, and often diſcharge from their ſtomachs.

The *Pewit-gull*, or *black-cap*, is ſo called from the head and throat being of a dark or black colour. The *red-legged gull*, the *brown-headed gull*, the *laughing gull*, which only differs from the others in having the legs black inſtead of red, are poſſibly only varieties of the ſame ſpecies. They are in length from fifteen to eighteen inches. The back and wings of theſe birds are in general aſh-colour, and the reſt of the body white. The young birds of theſe ſpecies are thought by ſome to be good eating.

The *guat gull*, which is found on the borders of the Caſpian ſea, though diſtinguiſhed by a black head, is quite a different ſpecies from our black-cap, as it equals in ſize the Barnacle gooſe, and weighs between two and three pounds: its voice too is as hoarſe as that of a raven.

The gull genus, like all other rapacious birds, lay but few eggs; and hence, in many places, their number is daily ſeen to diminiſh. Moſt of the kind are fiſhy taſted, with black ſtringy fleſh; and of theſe, the poor inhabitants of our northern iſlands make their wretched banquets. They have been long uſed to no other food; and even ſalted gull can be reliſhed by thoſe who know no better.

The gull, the petrel, the tern, have all nearly the ſame habits, the ſame nature, and are caught in the ſame manner, that is, at the moſt imminent riſk, and with the loſs of many lives in the courſe of a ſeaſon.

But of this dangerous ſport, a more particular deſcription will perhaps be acceptable to the reader. Thoſe who have been upon our coaſts know, that there are two different kinds of ſhores; that which ſlopes towards the water with a gentle declivity, and that which riſes with a precipitate boldneſs, and appears as a bulwark to repel the force of the invading deep. It is to ſuch ſhores as theſe that the vaſt variety of ſea fowl reſort, and in the cavities of theſe rocks they breed in ſafety. Of the tremendous ſublimity of theſe elevations, it is not eaſy to form an idea. The boaſted works of art, the higheſt towers, the nobleſt domes, are but ant-hills, when put in compariſon; the ſingle cavity of a rock often exhibits a coping higher that the ceiling of a Gothic cathedral. What ſhould we think of a precipice three quarters of a mile in height? and yet the rocks of

St. Kilda are ſtill higher! What muſt be our awe to approach the edge of that impending height, and to look down on the unfathomable vacuity below? To ponder on the terrors of falling to the bottom, where the waves that ſwell like mountains are ſcarcely ſeen to curl on the ſurface, and the roar of the ocean appears ſofter than the murmur of a brook! It is in theſe formidable manſions that myriads of ſea fowls are ever ſeen ſporting. To the ſpectator from above, thoſe birds, though ſome of them above the ſize of an eagle, ſeem ſcarcely as large as a ſwallow: and their loudeſt ſcreaming is ſcarce perceptible.

Yet even here theſe animals are not in perfect ſecurity from the arts and activity of man. Want, which is the great ſpring of human exertion, can force the cottager to tempt the moſt formidable dangers, and to put forth an endeavour almoſt beyond the force of man. When the precipice is to be aſſailed from below, the fowlers furniſh themſelves with poles of five or ſix ells in length, with a hook at the end, and fixing one of theſe poles in the girdle of the perſon who is to aſcend, his companions, in a boat, or on a projection of the cliff, aſſiſt his progreſs till he procures a firm footing. When this is accompliſhed, he draws the others up with a rope, and another man is forwarded again by means of the pole to a higher ſtation. Frequently the perſon who is in the higheſt ſituation holds another man ſuſpended by a rope, and directs his courſe to the place where the birds have placed their neſts. It unfortunately too often happens, that the man who holds the rope has not a footing ſufficiently ſecure, and in that caſe both of them inevitably periſh.

Some precipices are ſo abrupt, that they are not by any means to be aſcended from below. In this caſe a rope is provided of eighty or a hundred fathoms long, which one of the fowlers faſtens to his waiſt, and between his legs, in ſuch a manner as to ſupport him in a ſitting poſture. The rope is held by five or ſix perſons on the top, and it ſlides upon a piece of wood, which is laid ſo as to project beyond the precipice. By means of this apparatus, the man is gradually let down, and he attacks the habitations of the feathered race, with the moſt ſanguinary ſucceſs. This operation is however not without its dangers. By the deſcent and friction of the rope the looſe ſtones are furiouſly hurled down on every ſide. To defend himſelf from their blows, the fowler covers his head with a kind of helmet, or with a ſeaman's ſhaggy cap. Many however loſe their lives by this kind of accident. Thoſe who are unſkilful, frequently ſuffer by a giddineſs with which they are ſeized on beholding themſelves ſuſpended from this tremendous height: he, on the other hand, who is accuſtomed to the ſport, ſwings himſelf about with amazing dexterity; he directs his attack to that part of the rock which promiſes the ampleſt ſucceſs; with his fowling ſtaff he ſtrikes the game as it proceeds out of the holes; he occaſionally diſengages himſelf from the rope by which he was ſuſpended; he roams through the cavities of the rock, and when he has provided himſelf with a ſufficient booty, he gives the ſignal to his companions, and is again drawn up, when the feſtivity of the evening, among theſe poor and deſperate adventurers, generally compenſates for the fatigues and dangers of the day.

The MERGANSER genus includes only about ſix ſpecies, in all of which the bill is ſlender, and furniſhed at the end with a crooked nail, and grated or toothed both upper and under chap like a ſaw. The largeſt of the kind is the *gooſeander*, which weighs about four pounds. The bill is red; the head very full of feathers on the top and back part. The plumage is various and beautiful. The head and upper parts are fine gloſſy black, the rump and tail aſh colour, and the under parts of the neck and body a fine pale yellow. Its manners and appetites entirely reſemble thoſe of the diver. It feeds upon fiſh, for which it dives; it is ſaid to build its neſt upon trees, like the heron and the corvorant.

The *dun diver* is leſs than the gooſeander. The upper part of the head is reddiſh brown; the back and wings aſh-colour, and the lower parts of the body white. It is found in the ſame places, and has the ſame manners with the gooſeander. The *Red breaſted Merganſer* (See pl. LXXIII.) is ſtill ſmaller, weighing only two pounds. The head and neck are black, gloſſed with green, the reſt of the neck and the belly white; the upper part of the back is gloſſy black; the lower parts and the rump are ſtriated with brown and pale grey; on the wings there are white bars tipped with black, and the breaſt is reddiſh, mixed with black and white. The plumage of the female is leſs ſplendid; and they differ in another reſpect, viz. that the male has a very full and large creſt, the female only the rudiment of one.

The *ſmew* is rather larger than the teal, and is in general white, with ſome black marks; it is alſo creſted.

The *minute merganſer* is ſtill leſs than the ſmew. The head is ſlightly creſted, and of a ruſt colour; the back and tail are of a duſky aſh-colour; the breaſt mottled, and the belly white.

In plate LXXII, is repreſented the *hooded merganſer*, which is a native of North America. It is about the ſize of a wigeon. The head and neck are dark brown, the former ſurrounded with a large round creſt, the middle of which is white. The back and quills are black, the tail duſky; and the breaſt and belly white, undulated with black. The female is fainter in the colour of her plumage, and has a ſmaller creſt.

The DUCK genus embraces one hundred ſpecies, infinitely differing in ſize and plumage; many of them are rendered domeſtic, but a ſtill greater proportion are in their native untamed ſtate. All the ſpecies are diſtinguiſhed by their ſtrong flat bill, furniſhed at the end with an additional piece, termed a nail, and marked at the edges with lamellæ, or teeth.

Though theſe birds do not reject animal food when offered them, yet they can contentedly ſubſiſt upon vegetables, and ſeldom ſeek any other. They are eaſily provided for; wherever there is water there ſeems to be plenty. All the other web-footed tribes are continually voracious, continually preying. Theſe lead more harmleſs lives: the weeds on the ſurface of the water, or the inſects at the bottom, the graſs by the bank, or the fruits and corn in cultivated grounds, are ſufficient to ſatisfy their eaſy appetites.

They breed in great abundance, and lead their young to the pool the inſtant they are excluded.

As their food is ſimple, ſo their fleſh is nouriſhing and wholeſome. The ſwan was conſidered as a high delicacy among the ancients; the gooſe was abſtained from as totally indigeſtible. Modern manners have inverted taſtes; the gooſe is now become the favourite; and the ſwan is ſeldom brought to table, unleſs for the purpoſes of oſtentation. But at all times the fleſh of the duck was in high eſteem; the ancients thought even more highly of it than we do. We are contented to eat it as a delicacy; they alſo conſidered it as a medicine; and Plutarch aſſures us, that Cato kept his whole family in health, by feeding them with duck whenever they threatened to be out of order.

No bird makes a more indifferent figure upon land, or a more beautiful one in the water, than the *ſwan*. This fine bird has long been rendered domeſtic. The wild or *whiſtling ſwan*, though ſo ſtrongly reſembling this in colour and form, is yet a different bird; for it is very differently formed within. The wild ſwan is leſs than the tame almoſt a fourth; for as the one weighs twenty pounds, the other only weighs ſixteen pounds and three quarters. The colour of the tame ſwan is all over white; that of the wild bird is, along the back and the tips of the wings, of aſh-colour; the tame ſwan is mute, the wild one has a ſharp loud cry, particularly while flying. But theſe are ſlight differences, compared to what are found upon diſſection. The wild ſpecies is found in moſt of the northern regions, in America, and probably in the Eaſt Indies.

This *mute*, or *tame ſwan*, is as delicate in its appetites, as elegant in its form. Its chief food is corn, bread, herbs growing in the water, and roots and ſeeds, which are found near the margin. It prepares a neſt in ſome retired part of the bank, and chiefly where there is an iſlet in the ſtream. It is compoſed of water-plants, long graſs, and ſticks. The ſwan lays ſeven or eight eggs, white, much larger than thoſe of a gooſe, with a hard ſhell. It ſits near two months before its young are excluded; which are aſh-coloured when they firſt leave the ſhell, and for ſome months after.

All the ſtages of this bird's approach to maturity are ſlow, and ſeem to mark its longevity. It is two months hatching; a year in growing to its proper ſize. The ſwan is ſaid to be remarkable for its longevity. A gooſe has been known to live an hundred years; and the ſwan, from its ſuperior ſize, and from its harder, firmer fleſh, may naturally be ſuppoſed to live ſtill longer.

The *gooſe*, in its domeſtic ſtate, exhibits a variety of colours. The *wild gooſe*, or *grey lag*, always retains the ſame marks: the whole upper part is aſh-coloured; the breaſt and belly are of a dirty white; the bill is narrow at the baſe, and at the tip it is black; the legs are of a ſaffron colour, and the claws black. It frequently weighs about ten pounds.

The wild gooſe is ſuppoſed to breed in the northern parts of Europe; and, in the beginning of winter, to deſcend into more temperate regions. If they come to the ground by day, they range themſelves in a line, like cranes; and ſeem rather to have deſcended for reſt, than for other refreſhment. When they have ſat in this manner for an hour or two, we have heard one of them, with a loud long note, ſound a kind of charge, to which the reſt punctually attended, and they purſued their journey with renewed alacrity. Their flight is very regularly arranged; they either go in a line a-breaſt, or in two lines, joining in an angle in the middle.

The *bean gooſe* is a bird of paſſage, and arrives in Lincolnſhire about autumn, and departs in May. It weighs about ſix pounds. The bill is ſmaller than in the preceding ſpecies. The head and neck are brown, the back and wings aſh-colour, and the breaſt and belly a dirty white. It feeds much on the young corn, beans, &c. whence its name.

The *barnacle* differs in ſome reſpects from all theſe; being leſs than any of them, with a black bill, much ſhorter than any of the preceding. It is ſcarcely neceſſary to combat the idle error of this bird's being bred from a ſhell ſticking to ſhips' bottoms; it is well known to be hatched from an egg, in the ordinary manner, and to differ in very few particulars from all the reſt of its kind. The upper parts of the plumage are black, the forehead, chin, and all the under parts white.

The *brent gooſe* is ſtill leſs than the former, and not bigger than a Muſcovy duck, except that the body is longer. The head, neck, and upper part of the breaſt, are black; about the middle of the neck, on each ſide, are two ſmall ſpots, or lines of white, which together appear like a ring. Both this and the preceding frequent our coaſts in winter; and in ſome ſeaſons have been ſo numerous, on the coaſts of Picardy, as to become a peſt to the inhabitants.

The *tame duck* is the moſt eaſily reared of all our domeſtic animals. The *wild duck*, or *mallard*, differs, in many reſpects, from the tame; and in them there is ſtill greater variety than among the domeſtic kinds.

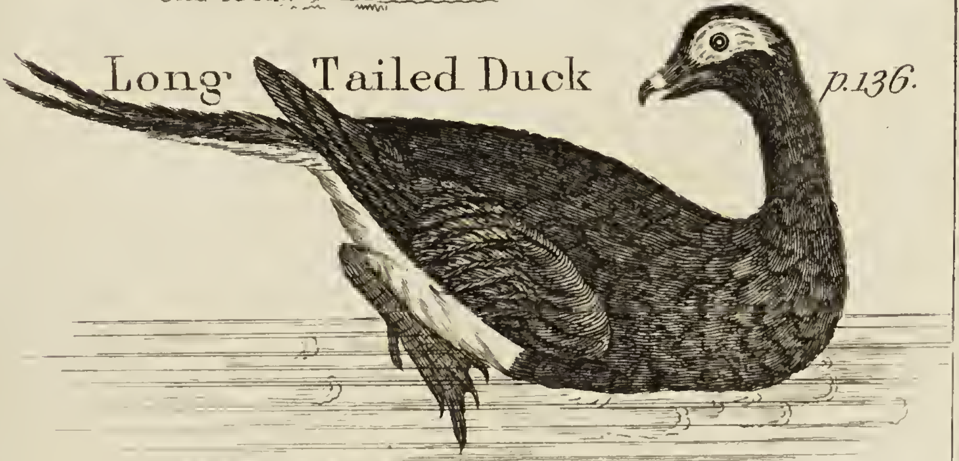
The moſt obvious diſtinction between wild and tame ducks is in the colour of their feet; thoſe of the tame duck being black; thoſe of the wild duck yellow. The difference between wild ducks among each other, ariſes as well from their ſize, as the nature of the place they feed in. Sea-ducks, which feed in the ſalt-water, and dive much, have a broad bill, bending upwards, a large hind toe, and a long blunt tail. Pond-ducks, which feed in plaſhes, have a ſtraight and narrow bill, a ſmall hind toe, and a ſharp pointed train. The former are called, by our decoy-men, foreign ducks; the latter are ſuppoſed to be natives of England. In this tribe, we may rank, as natives of Europe, the *Eider Duck* (See pl. LXX.) which is double the ſize of a common duck, with a black bill; and the male of which is wholly white, except the crown of the head, the coverts of the wings, the belly, and tail, which are black; the *Velvet Duck*, not ſo large, and with a yellow bill; the *Scoter Duck*, or *Black Diver*, with a knob at the baſe of a yellow bill; the *Tufted Duck*, adorned with a thick creſt; the *Scaup Duck*, leſs than the common duck, with the bill of a greyiſh blue colour; the *Golden Eye*, with a large white ſpot at the corners of the mouth, reſembling an eye; the *Sheldrake*, with the bill of a bright red, and ſwelling into a knob; the *Mallard*, which is the ſtock whence our tame breed has probably been produced; the *ſhoveller*, which has a bill three inches long, and remarkably broad at the end; the *Pintail*, with the two middle feathers of the tail three inches longer than the reſt; the *Pochard*, with the head and neck of a bright bay; the *long-tailed duck*, the general colour of whoſe plumage is deep chocolate, and the outer feathers of the tail, which are white, four inches longer than the reſt (See pl. LXX.); the *widgeon*, with a lead-coloured bill, and the plumage of the back marked with narrow black and white undulated lines, but beſt known by its whiſtling ſound: laſtly, the *Teal*, which is the ſmalleſt of this kind, with the bill black, the head and upper part of the neck of a bright bay. Theſe are the moſt common birds of the duck kind among ourſelves; but who can deſcribe the amazing variety of this tribe, if he extends his view to the different quarters of the world? The moſt noted of the foreign tribe are, the *Muſcovy Duck*, or, more properly ſpeaking, the Muſk Duck, ſo called from a ſuppoſed muſky ſmell, with naked ſkin round the eyes, and which is a native of Africa. The *Braſilian Duck*, which is of the ſize of a gooſe, all over black except the tips of the wings. The *American Wood Duck*, with a variety of beautiful colours, and a plume of feathers, which falls from the back of the head like a friar's cowl.

The *Chineſe*, or *Mandarin Duck*, is ſomewhat leſs than a wigeon, but remarkable for its elegance and beauty. The prevailing colour of its plumage on the upper parts is duſky brown; the ſcapulars, however, are black, and at the bend of the wing are three tranſverſe ſtreaks of black,

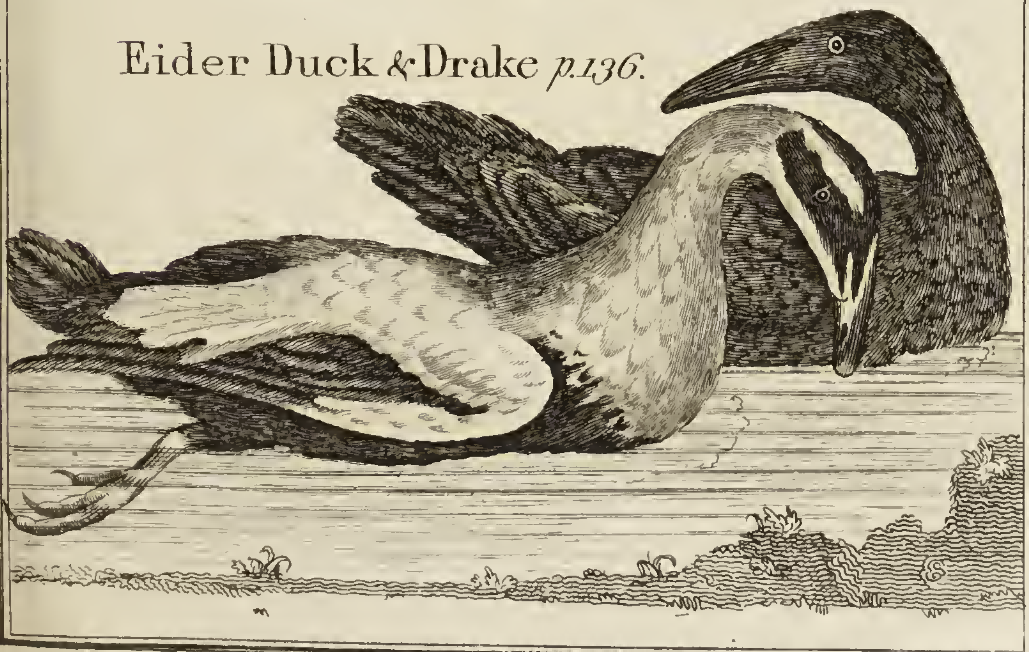
Plate 70.

King Fiſher *p.65.*

Long Tailed Duck *p.136.*



Eider Duck & Drake *p.136.*



and two of white alternate. The neck and breaſt are cheſnut; the beak and legs are red, and the head is adorned with a fine expanded creſt, the baſe of which is white, and the upper part a beautiful gloſſy green.

Theſe, and many others, might be added, were increaſing the number of names the way to enlarge the ſphere of our comprehenſion.

All theſe live in the manner of our domeſtic ducks, keeping together in flocks in the winter, and flying in pairs in ſummer, bringing up their young by the water-ſide, and leading them to their food as ſoon as out of the ſhell. Their neſts are uſually built among heath or ruſhes, not far from the water; and they lay twelve, fourteen, or more eggs before they ſit; yet this is not always their method; the dangers they continually encounter from their ſituation, ſometimes oblige them to change their manner of building; and their awkward neſts are often ſeen exalted on the tops of trees. This muſt be a very great labour to perform, as the duck's bill is but ill-formed for building a neſt, and giving the materials of which it is compoſed a ſufficient ſtability to ſtand the weather. The neſt, whether high or low, is generally compoſed of the longeſt graſs, mixed with heath, and is lined within with the bird's own feathers. The *eider duck* is particularly remarkable for the warmth of its neſt. This bird, which, as was ſaid, is above twice as large as the common duck, and reſides in the colder climates, lays from ſix to eight eggs, making her neſt among the rocks or the plants along the ſea-ſhore. The external materials of the neſt are ſuch as are in common with the reſt of the kind; but the inſide lining, on which the eggs are immediately depoſited, is at once the ſofteſt, warmeſt, and the lighteſt ſubſtance with which we are acquainted. This is no other than the inſide down which covers the breaſt of the bird in the breeding ſeaſon. This the female plucks off with her bill, in order to line the inſide of her neſt. The natives watch the place where ſhe begins to build, and, ſuffering her to lay, take away both the eggs and the neſt. The duck, however, not diſcouraged by the firſt diſappointment, builds and lays in the ſame place a ſecond time, and this they in the ſame manner take away: the third time ſhe builds, but the drake muſt ſupply the down from his breaſt to line the neſt with: and, if this be robbed, they both forſake the place, and breed there no more. This down the natives take care to ſeparate from the dirt and moſs with which it is mixed; and, though no people ſtand in more need of a warm covering than themſelves, yet their neceſſities compel them to ſell it to the more indolent and luxurious inhabitants of the ſouth, for brandy and tobacco.

As theſe animals poſſeſs the faculties of flying and ſwimming, ſo they are in general birds of paſſage, and it is moſt probable perform their journeys acroſs the ocean as well on the water as in the air. Thoſe that migrate to this country, on the approach of winter, are ſeldom found ſo well taſted or ſo fat as the fowls that continue with us the year round: their fleſh is often lean, and ſtill oftener fiſhy; which flavour it has probably contracted in the journey, as their food in the lakes of Lapland, whence they deſcend, is generally of the inſect kind.

As ſoon as they arrive among us, they are generally ſeen flying in flocks, to make a ſurvey of thoſe lakes where they intend to take up their reſidence for the winter. Lakes, with a marſh on one ſide, and a wood on the other, are ſeldom without vaſt quantities of wild fowl. The greateſt quantities are taken in decoys; which, though well known near London, are yet untried in the remoter parts of the country. The manner of making and managing a decoy is as follows:

A place is to be choſen for this purpoſe far remote from the common highway, and all noiſe of people. When the place is choſen, the pool, if poſſible, is to be planted round with willows, unleſs a wood anſwers the purpoſe of ſhading it on every ſide. On the ſouth and north ſide of this pool are two, three, or four ditches or channels, made broad towards the pool, and growing narrower till they end in a point. Theſe channels are to be covered over with nets, ſupported by hooped ſticks bending from one ſide to the other; ſo that they form a vault or arch growing narrower and narrower to the point, where it is terminated by a tunnel-net, like that in which fiſh are caught in weirs. Along the banks of theſe channels ſo netted over, which are called pipes, many hedges are made of reeds ſlanting to the edge of the channel, the acute angles to the ſide next the pool. The whole apparatus alſo is to be hidden from the pool by a hedge of reeds along the margin, behind which the fowler manages his operations. The place being fitted in this manner, the fowler is to provide himſelf with a number of wild ducks made tame, which are called decoys. Theſe are always to be fed at the mouth or entrance of the pipe, and to be accuſtomed to come at a whiſtle.

As ſoon as the evening is ſet in, *the decoy riſes*, as they term it, and the wild fowl feed during the night. If the evening be ſtill, the noiſe of their wings, during their flight, is heard at a very great diſtance, and produces no unpleaſing ſenſation. The fowler, when he finds a fit opportunity, and ſees his decoy covered with fowl, walks about the pool, and obſerves into what pipe the birds gathered in the pool may be enticed or driven. Then caſting hemp-ſeed, or ſome ſuch ſeed as will float on the ſurface of the water, at the entrance and up along the pipe, he whiſtles to his decoy ducks, who inſtantly obey the ſummons, and come to the entrance of the pipe, in hopes of being fed as uſual. Thither alſo they are followed by a whole flock of wild ones, who little ſuſpect the danger preparing againſt them. The wild ducks, therefore, purſuing the decoy ducks, are led into the broad mouth of the channel or pipe, nor have the leaſt ſuſpicion of the man, who keeps hidden behind one of the hedges. When they have got up the pipe, however, finding it grow more and more narrow, they begin to ſuſpect danger, and would return back; but they are now prevented by the man, who ſhews himſelf at the broad end below. Thither, therefore, they dare not return; and riſe they may not, as they are kept by the net above from aſcending. The only way left them, therefore, is the narrow-funnelled net at the bottom; into this they fly, and there they are taken.

It often happens, however, that the wild fowl are in ſuch a ſtate of ſleepineſs or dozing, that they will not follow the decoy ducks. Uſe is then generally made of a dog who is taught his leſſon. He paſſes backward and forward between the reed-hedges, in which there are little holes, both for the decoy man to ſee, and for the little dog to paſs through. This attracts the eye of the wild fowl; who, prompted by curioſity, advance towards this little animal, while he all the time keeps playing among the reeds, nearer and nearer the funnel, till they follow him too far to recede. Sometimes the dog will not attract their attention till a red handkerchief, or ſomething very ſingular, be put about him. The decoy ducks never enter the funnel-net with the reſt, being taught to dive under water as ſoon as the reſt are driven in.

To this manner of taking wild fowl in England, we will ſubjoin another ſtill more extraordinary, frequently practiſed in China. Whenever the fowler ſees a number of ducks ſettled in any particular plaſh of water, he ſends off two or three gourds to float among them. Theſe gourds reſemble our pompions; but, being made hollow, they ſwim on the ſurface of the water; and on one pool there may ſometimes be ſeen twenty or thirty of theſe gourds floating together. The fowl at firſt are a little ſhy at coming near them; but by degrees they come nearer; and as all birds at laſt grow familiar with a ſcare-crow, the ducks gather about theſe, and amuſe themſelves by whetting their bills againſt them. When the birds are as familiar with the gourds as the fowler could wiſh, he then prepares to deceive them in good earneſt. He hollows out one of theſe gourds large enough to put his head in; and, making holes to breathe and ſee through, he claps it on his head. Thus accoutred, he wades ſlowly into the water, keeping his body under, and nothing but his head in the gourd above the ſurface; and in that manner moves imperceptibly towards the fowls, who ſuſpect no danger. At laſt, however, he fairly gets in among them; while they, having been long uſed to ſee gourds, take not the leaſt fright while the enemy is in the very midſt of them; and an inſidious enemy he is; for ever as he approaches a fowl, he ſeizes it by the legs, and draws it in a jerk under water. There he faſtens it under his girdle, and goes to the next, till he has thus loaded himſelf with as many as he can carry away. When he has got his quantity, without ever attempting to diſturb the reſt of the fowls on the pool, he ſlowly moves off again; and, in this manner, pays the flock three or four viſits in a day. Of all the various artifices for catching fowl, this ſeems likely to be attended with the greateſt ſucceſs, and is the moſt practiſed in China.

The Pelican is properly a foreign bird, but as the genus includes ſome ſpecies which are found in our European climates, we have introduced it between the domeſtic and foreign animals of this order. The diſtinguiſhing characteriſtic of this genus is a naked gullet, and capable of great diſtention.

The *great white Pelican* of *Africa* (See pl. LXIX.) is much larger than a ſwan, and ſomewhat of the ſame ſhape and colour. Its four toes are all webbed together; and its neck, in ſome meaſure, reſembles that of a ſwan: but that ſingularity in which

Plate.69.

The Grebe *p.118.*

The Puffin *or* Coulterneb *p.123.*

The Pelican *p.140.*

which it differs from all other birds, is in the bill, and the great pouch underneath, which are wonderful, and demand a diſtinct deſcription. This enormous bill is fifteen inches from the point to the opening of the mouth, which is a good way back behind the eyes. The baſe of the bill is ſomewhat greeniſh; but it varies towards the end, being of a reddiſh blue. To the lower edges of the under-chap, hangs a bag, reaching the whole length of the bill to the neck, which is ſaid to be capable of containing fifteen quarts of water. This bag the bird has a power of wrinkling up into the hollow of the under-chap; but, by opening the bill, and putting one's hand down into the bag, it may be diſtended at pleaſure. It is not covered with feathers, but a ſhort downy ſubſtance, as ſmooth and as ſoft as ſatin. Tertre affirms, that this pouch will hold as many fiſh as will ſerve ſixty hungry men for a meal. Such is the formation of this extraordinary bird, which is a native of Africa and America. It was once alſo known in Europe, particularly in Ruſſia; but it ſeems to have deſerted our coaſts.

In the iſland of Manilla the pelicans are of a roſe colour, and in America they are brown. They are all torpid and inactive to the laſt degree, ſo that nothing can exceed their indolence but their gluttony. It is only from the ſtimulations of hunger, that they are excited to labour; for otherwiſe they would continue always in fixed repoſe. When they have raiſed themſelves about thirty or forty feet above the ſurface of the ſea, they turn their head, with one eye downwards, and continue to fly in that poſture. As ſoon as they perceive a fiſh ſufficiently near the ſurface, they dart down upon it with the ſwiftneſs of an arrow, ſeize it with unerring certainty, and ſtore it up in their pouch. They then riſe again, though not without great labour, and continue hovering and fiſhing, with their head on one ſide, as before.

This work they continue, with great effort and induſtry, till their bag is full; and then they fly to land, to devour and digeſt, at leiſure, the fruits of their induſtry. This, however, it would appear, they are not long performing; for, towards night, they have another hungry call; and they again, reluctantly, go to labour. Their life is ſpent between ſleeping and eating; and they are as foul as they are voracious, as they are, every moment, voiding excrements in heaps, as large as one's fiſt. The female makes no preparation for her neſt, nor ſeems to chuſe any place in preference to lay in, but drops her eggs on the bare ground, to the number of five or ſix, and there continues to hatch them. The fleſh is not fit to eat.

With all the ſeeming indolence of this bird, it is not entirely incapable of inſtruction in a domeſtic ſtate. Father Raymond aſſures us, that he has ſeen one ſo tame and well educated among the native Americans, that it would go off in the morning, at the word of command, and return before night to its maſter, with its great paunch diſtended with plunder; a part of which the ſavages would make it diſgorge, and a part they would permit it to reſerve for itſelf.

"The pelican," as Faber relates, "is not deſtitute "of other qualifications. One which was brought alive "to the Duke of Bavaria's court, where it lived forty "years, ſeemed to be poſſeſſed of very uncommon ſen-"ſations. It was much delighted in the company and "converſation of men, and in muſic, both vocal and "inſtrumental; for it would willingly ſtand," ſays he, "by thoſe that ſung or ſounded the trumpet; and, "ſtretching out its head, and turning its ear to the "muſic, liſtened very attentively to its harmony, though "its own voice was little pleaſanter than the braying of "an aſs."

Geſner tells us, that the emperor Maximilian had a tame pelican, which lived for above eighty years, and which always attended his army on their march.

The *Frigate Pelican*, or *Man of War Bird* (See pl. LXXIV.) is chiefly met with between the tropics. It is the ſize of a large fowl. The bill is ſlender, and five inches long, from the baſe of which a dark reddiſh ſkin ſpreads on each ſide of the head, and a large bag hangs down the throat; the whole plumage is browniſh black, the tail is long, and much forked. It is often found above a hundred, and ſometimes two hundred leagues from land, and ſometimes ſettles on the maſts of ſhips. Its amazing length of wing, which is not leſs than fourteen feet, enables it to take immenſe flights; and, when it is not ſucceſsful in fiſhing, it attacks the gulls and other water fowl, and makes them diſgorge the fiſh which they have taken.

The Corvorant is about the ſize of a large Muſcovy duck, and may be diſtinguiſhed by its four toes being united by membranes together; and by the middle toe being toothed or notched, like a ſaw, to aſſiſt it in holding its fiſhy prey. The head and neck of this bird are of a ſooty blackneſs; and the body thick and heavy, more inclining in figure to that of the gooſe than the gull. As ſoon as the winter approaches, they are ſeen diſperſed along the ſea-ſhore, and aſcending up the mouths of freſh-water rivers, carrying deſtruction to all the finny tribe. They are moſt remarkably voracious, and have a moſt ſudden digeſtion. Their appetite is for ever craving, and never ſatisfied. This gnawing ſenſation may probably be encreaſed by the great quantity of ſmall worms that fill their inteſtines, and which their unceaſing gluttony contributes to engender.

This bird has the moſt rank and diſagreeable ſmell, and is more fœtid than even carrion, when in its moſt healthful ſtate. It is ſeen as well by land as ſea; it fiſhes in freſh-water lakes, as well as in the depths of the ocean; it builds in the cliffs of rocks, as well as on trees; and preys not only in the day-time, but by night.

Its indefatigable nature, and its great power in catching fiſh, were, probably, the motives that induced ſome nations to breed this bird up tame, for the purpoſes of fiſhing. The deſcription of their manner of fiſhing is thus delivered by Faber.

" When they carry them out of the rooms where they are " kept, to the fiſh-pools, they hood-wink them, that they " may not be frightened by the way. When they are " come to the rivers, they take off their hoods; and hav- " ing tied a leather thong round the lower part of their " necks, that they may not ſwallow down the fiſh they " catch, they throw them into the river. They preſently " dive under water; and there, for a long time, with won- " derful ſwiftneſs, purſue the fiſh; and, when they have " caught them, riſe to the top of the water, and preſſing " the fiſh lightly with their bills, ſwallow them; till " each bird hath, after this manner, devoured five or " ſix fiſhes. Then their keepers call them to the fiſt, " to which they readily fly; and, one after another, " vomit up all their fiſh, a little bruiſed with the firſt " nip given in catching them. When they have done " fiſhing, ſetting the birds on ſome high place, they looſe " the ſtring from their necks, leaving the paſſage to the " ſtomach free and open; and, for their reward, they " throw them part of their prey; to each one or two fiſhes, " which they will catch moſt dexterouſly, as they are falling " in the air."

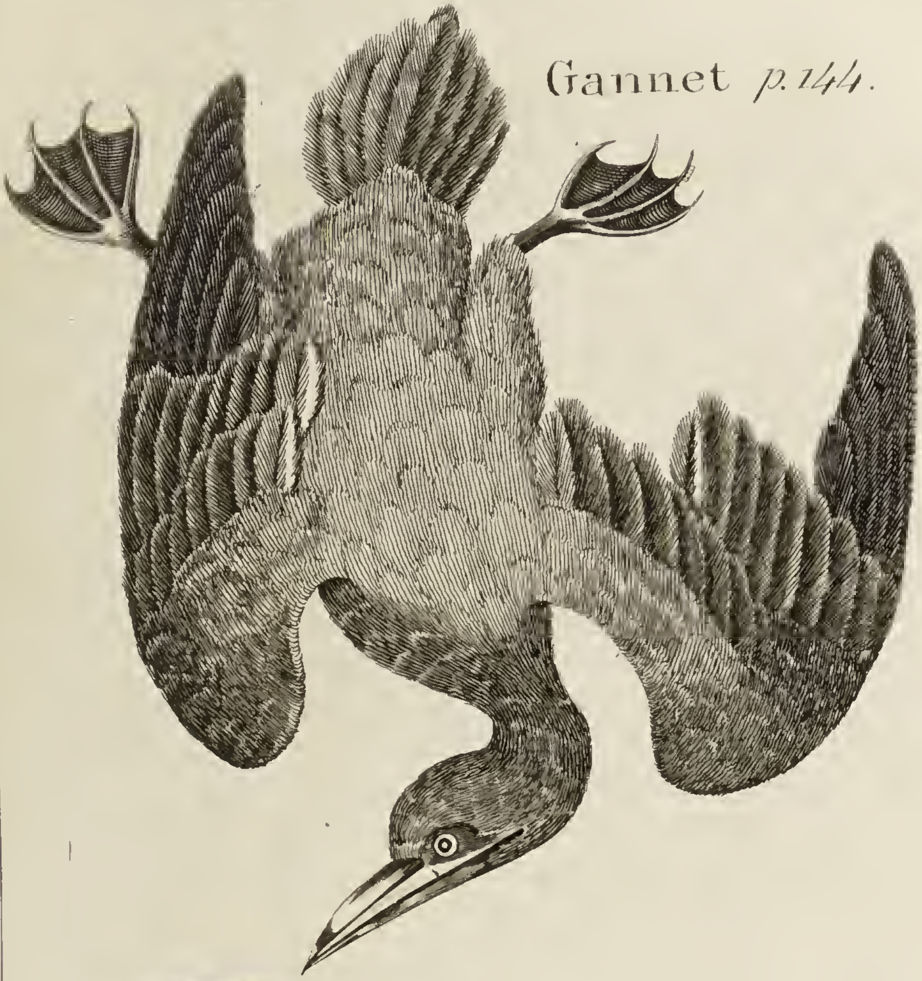
At preſent, the corvorant is trained up in every part of China for the ſame purpoſe. "It is very pleaſant to "behold with what ſagacity they portion out the lake or "the canal where they are upon duty. When they have "found their prey, they ſeize it with their beak by the "middle, and carry it without fail to their maſter. When "the fiſh is too large, they then give each other mutual "aſſiſtance: one ſeizes it by the head, the other by the "tail, and in this manner carry it to the boat together. "They have always, while they fiſh, a ſtring faſtened round "their throats, to prevent them from devouring their "prey."

The *Shag*, (See pl. LXXV.) which the French call the leſſer corvorant, is another of the pelican genus. The *common* ſhag is in length two feet ſix inches, and the extent of its wings eight feet. The general colour of its plumage is black, the belly is duſky, and the head and neck gloſſed with green. Like the corvorant it builds in trees. The *creſted* ſhag is ſomewhat leſs than the preceding, and is leſs common. The *violet*, and *red-faced ſhags*, are both natives of Kamſchatka; and *ſpotted* and *caranculated ſhags* are found in New Zealand. Beſides theſe, there are ſeveral other foreign ſpecies, particularly in Africa, where there are two kinds of ſhags not larger than a teal.

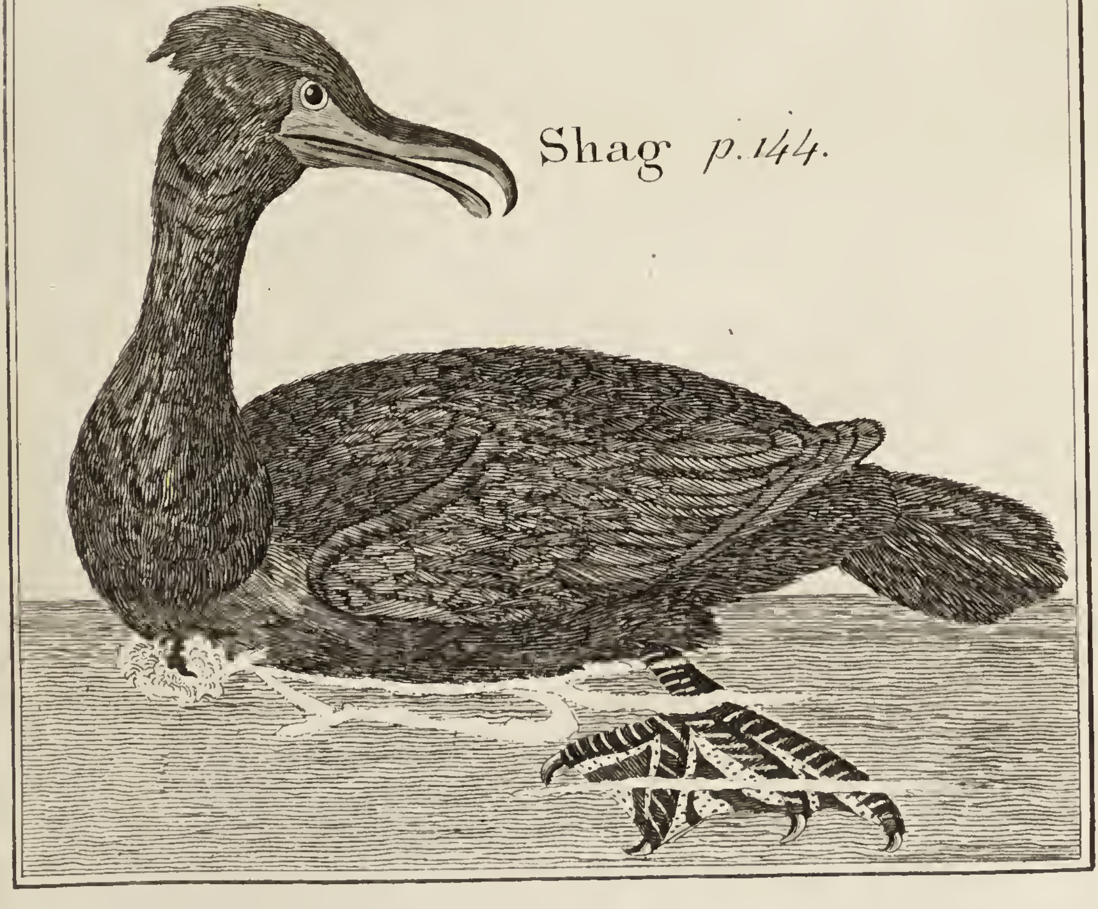
The *Gannet*, or *Soland Gooſe*, (See pl. LXXV.) is of the ſize of a tame gooſe, but its wings much longer, being ſix feet over. The bill is ſix inches long, ſtraight almoſt to the point. It differs from the corvorant in ſize, being larger; in its colour, which is chiefly white; and by its having no noſtrils, but in their place a long furrow that reaches almoſt to the end of the bill. From the corner of the mouth is a narrow ſlip of black bare ſkin, that extends to the hind part of the head; beneath the ſkin is another that, like the pouch of the pelican, is dilatable, and of ſize ſufficient to contain five or ſix entire herrings, which in the breeding ſeaſon it carries at once to its mate or its young.

Theſe birds, which ſubſiſt entirely upon fiſh, chiefly reſort to thoſe uninhabited iſlands where their food is found in plenty, and men ſeldom come to diſturb them. The iſlands to the north of Scotland, the Skeling iſlands off the coaſts of Kerry, in Ireland, and thoſe that lie in the north ſea off Norway, abound with them. But it is on the Baſs iſland, in the Firth of Edinburgh, where they

Plate 75.



Gannet p. 144.



Shag p. 144.

are ſeen in the greateſt abundance. "It is ſcarcely poſ-
"ſible to walk there without treading on them: the flocks
"of birds upon the wing, are ſo numerous, as to darken
"the air like a cloud; and their noiſe is ſuch, that one
"cannot, without difficulty, be heard by the perſon next
"to him."

The gannet is a bird of paſſage. In winter it ſeeks the more ſouthern coaſts of Cornwall, hovering over the ſhoals of herrings and pilchards that then come down from the northern ſeas: its firſt appearance in the northern iſlands is in the beginning of ſpring; and it continues to breed till the end of ſummer. But, in general, its motions are determined by the migrations of the immenſe ſhoals of herrings that come pouring down at that ſeaſon, through the Britiſh Channel, and ſupply all Europe as well as this bird with their ſpoil. The gannet aſſiduouſly attends the ſhoal in their paſſage, keeps with them in their whole circuit round the iſland, and ſhares with the fiſhermen this exhauſtleſs banquet. As it is ſtrong of wing, it never comes near the land; but is conſtant to its prey. The young gannet is accounted a great dainty by the Scots, and ſold very dear.

The *booby* is alſo a ſpecies of the pelican. The upper parts of the plumage are brown, and the breaſt and belly white. It is found in ſeveral parts of America, and is deſcribed as a very ſimple bird.

THE ALBATROSS is one of the largeſt and moſt formidable birds of Africa and America. The largeſt, which is called the *wandering albatroſs*, is rather larger than a ſwan; and its wings, when extended, ten feet from tip to tip. The bill, which is ſix inches long, is yellowiſh, and terminates in a crooked point. The top of the head is of a bright brown; the back is of a dirty, deep ſpotted brown; and the belly, and under the wings, is white. The toes, which are webbed, are of a fleſh colour.

This bird is an inhabitant of the tropical climates, and alſo beyond them, as far as the Streights of Magellan, in the South Seas. It not only eats fiſh, but alſo ſuch ſmall water-fowl as it can take by ſurprize. It preys, as the gull kind do, upon the wing, and chiefly purſues the flying fiſh that are forced from the ſea by the dolphins.

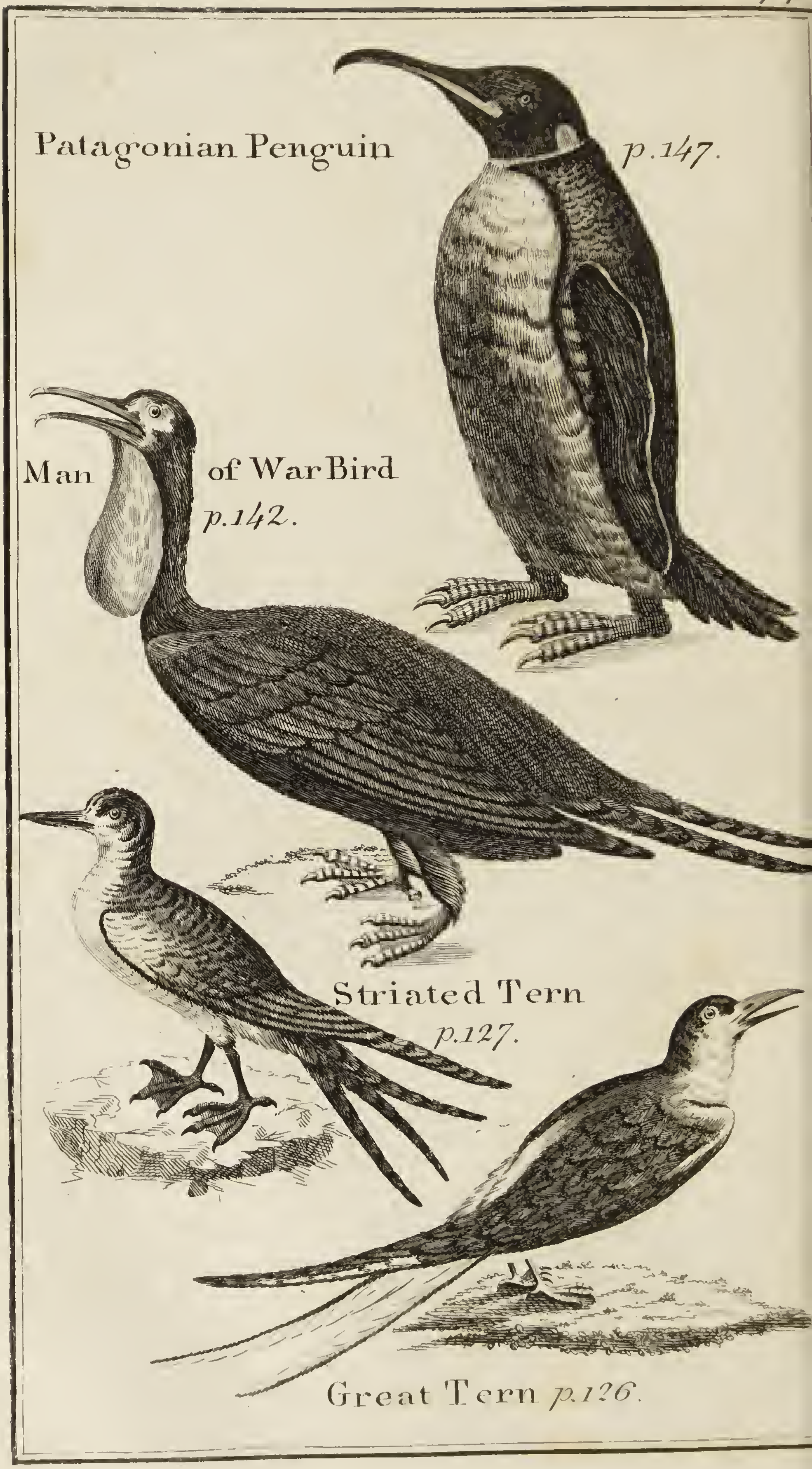
The albatroſs ſeems to have a peculiar affection for the penguin, and a pleaſure in its ſociety. They are always ſeen to chooſe the ſame places of breeding; ſome diſtant, uninhabited iſland, where the ground ſlants to the ſea, as the penguin is not formed either for flying or climbing. In ſuch places their neſts are ſeen together, as if they ſtood in need of mutual aſſiſtance and protection. In the middle, on high, the albatroſs raiſes its neſt, on heath, ſticks and long graſs, about two feet above the ſurface; and round this, the penguins make their lower ſettlements, rather in holes in the ground; and moſt uſually eight penguins to one albatroſs.

There are about three other ſpecies of albatroſs, all of them ſmaller than the preceding; that repreſented in plate LXVI, is called the *yellow-noſed albatroſs.* The upper parts of the plumage are a duſky blue black, and the rump and under parts white; but what peculiarly diſtinguiſhes it is, that the bill, which is four inches long, is black, all but the upper ridge, which is yellow quite to the tip. It inhabits the South Seas within the tropics.

The Skimmer, or cutwater, is twenty inches in length, and in breadth three feet ſeven inches. The bill is of a very ſingular ſtructure, the upper chap, or mandible, being above an inch ſhorter than the under, and the upper ſhuts into it, as a razor into its handle. The baſe of the bill is red, the reſt black, and on the ſides are ſeveral furrows. The forehead, chin, and all the under parts are white; the upper parts of the plumage black, with a bar of white acroſs each wing. The tail is ſhort and forked. It inhabits all America; is commonly on the wing, and ſkims along the ſurface to catch the ſmall fiſh on which it feeds. It is frequently known by the name of the *razor-bill.*

The Penguin genus includes about nine ſpecies, which ſeem to hold the ſame place in the ſouthern parts of the world, as the auks do in the North, neither of them having ever been obſerved within the tropics. The wings of the larger ſpecies do not enable them to riſe out of the water, but ſerve them rather as paddles to help them forward, when they attempt to move ſwiftly; and in a manner walk along the ſurface of the water. Even the ſmaller kinds ſeldom fly by choice; they flutter their wings with the ſwifteſt efforts without making way; and though they have but a

Plate 74.


Patagonian Penguin p.147.
Man of War Bird p.142.
Striated Tern p.127.
Great Tern p.126.

ſmall weight of body to ſuſtain, yet they ſeldom venture to quit the water, where they are provided with food and protection.

As the wings of the penguin tribe are unfitted for flight, their legs are ſtill more awkwardly adapted for walking. This whole tribe have all above the knee hid within the belly; and nothing appears but two ſhort legs, or feet, as ſome would call them, that ſeem ſtuck under the rump, and upon which the animal is very awkwardly ſupported. They ſeem, when ſitting or attempting to walk, like a dog that has been taught to ſit up, or to move a minuet. Their ſhort legs drive the body in progreſſion from ſide to ſide; and were they not aſſiſted by their wings, they could ſcarcely move faſter than a tortoiſe.

This awkward poſition of the legs, which ſo unqualifies them for living upon land, adapts them admirably for a reſidence in water, in that, the legs placed behind the moving body, puſhes it forward with greater velocity; and theſe birds, like Indian canoes, are the ſwifteſt in the water, by having their paddles in the rear.

They are alſo covered more warmly all over the body with feathers, than any other birds whatever; ſo that the ſea ſeems entirely their element.

The *Patagonian penguin* (See pl. LXXIV.) weighs about forty pounds, and is four feet three inches in length. The bill meaſures four inches and a half, but is ſlender. The head, throat, and hind part of the neck are brown, the back of a deep aſh colour, and all the under parts white. The *Magellanic penguin* is about the ſize of a gooſe; the upper parts of the plumage are black, and the under white. Theſe birds walk erect with their heads on high, their fin-like wings hanging down like arms; ſo that to ſee them at a diſtance, they look like ſo many children with white aprons. Hence they are ſaid to unite in themſelves the qualities of men, fowls, and fiſhes. Like men they are upright; like fowls they are feathered; and like fiſhes, they have fin-like inſtruments, that beat the water before, and ſerve for all the purpoſes of ſwimming rather than flying.

There are *creſted penguins* at Faukland's iſland, which are very beautiful birds; and there is a ſpecies at New Zealand not larger than a teal.

All the ſpecies feed upon fiſh; and ſeldom come aſhore, except in the breeding ſeaſon. Their fleſh is rank and filhy; though our ſailors ſay, that *it is pretty good eating.*

In ſome the fleſh is ſo tough, and the feathers ſo thick, that they ſtand the blow of a ſcymitar without injury.

The penguin lays but one egg; and, in frequented ſhores, is found to burrow like a rabbit: ſometimes three or four take poſſeſſion of one hole, and hatch their young together. The egg of the penguin is very large for the ſize of the bird, that of the ſmaller ſorts being generally found bigger than that of a gooſe.

The TROPIC BIRD includes only three known ſpecies, which are all diſtinguiſhed by a wedge-like tail, the two middle feathers extending a vaſt length beyond the others.

The *Common Tropic Bird* is about the ſize of a wigeon. The length to the tip of the two long feathers is nearly three feet. The bill is three inches long, and red. The head, neck, and under parts of the body are quite white. The upper parts of the plumage white alſo, but marked with black lines. The two middle feathers of the tail meaſure twenty inches, and project fifteen inches beyond the reſt. It takes its name from being chiefly found within the tropics. It frequently flies very high, but generally attends upon the flying fiſhes in their eſcape from their watery enemies; and they have now and then been found in calm weather ſupinely floating on the backs of the drowſy tortoiſes. Their fleſh is not good, but is ſometimes eaten by the hungry ſailors.

On the Palmerſton iſland there is a *black billed* tropic bird; and at Mauritius there is a tropic bird with a bill and tail of a beautiful roſe colour.

The DARTER is diſtinguiſhed by a peculiarly long and ſlender neck, and includes three ſpecies.

The *white-bellied Darter* is ſcarcely ſo large as a mallard, but its neck is ſo long that it meaſures not leſs than two feet ten inches. The bill is three inches long, ſtraight and pointed. The neck is covered with downy ſoft feathers, of a reddiſh grey; the upper parts of the plumage are duſky black, daſhed with white; the under parts pure ſilvery white. It is a native of Braſil, and is extremely expert at catching fiſh.

The *black bellied Darter* (See pl. LXVI.) is the ſize of the common duck. The head, neck, and breaſt are light brown. The back, ſcapulars, &c. marked with ſtripes of black and white. The quill feathers, belly, thighs, and tail are deep black. The four toes are united like thoſe of the corvorant. In the iſlands of Ceylon and Java it ſits on the ſhrubs that hang over the water, and in a country where people are ſo apprehenſive of ſerpents, it often terrifies the paſſenger, by darting out its long and ſlender neck, which in their ſurprize they miſtake for the attack of ſome fatal reptile.

CHAP. XXIX.

Of Fiſhes in general.—Of Cetaceous Fiſhes.—The Whale—The Fin Fiſh.—The Narwhale, or Unicorn.—The Spermaceti Whale.—The Dolphin.—Grampus, Porpeſſe, &c.

THE number of fiſh to which we have given names, and with the figure of which at leaſt we are a little acquainted, is, according to Linnæus, above four hundred. The majority of theſe are confined to the ſea, and would expire in the freſh water, though there are a few which annually ſwim up the rivers, to depoſit their ſpawn.

The chief inſtruments of a fiſh's motion are the fins, which in ſome fiſh are more numerous than in others. The fiſh, in a ſtate of repoſe, ſpreads all its fins, and ſeems to reſt upon its pectoral * and ventral † fins near the bottom: if the fiſh folds up, for it has the power of folding, either of its pectoral fins, it inclines to the ſame ſide; folding the right pectoral fin, its body inclines to the right ſide; folding the left fin, it inclines to that ſide in turn. When the fiſh deſires to have a retrograde motion, ſtriking with the pectoral fins, in a contrary direction, effectually produces it. If the fiſh deſires to turn, a blow from the tail ſends it about; but if the tail ſtrikes both ways, then the motion is progreſſive. In purſuance of theſe obſervations, if the dorſal ‡ and ventral fins be cut off, the fiſh reels to the right and left, and endeavours to ſupply its loſs by keeping the reſt of its fins in conſtant employment. If the right pectoral fin be cut off, the fiſh leans to that ſide; if the ventral fin on the ſame ſide be cut away, then it loſes its equilibrium entirely. When the tail is cut off, the fiſh loſes all motion, and gives itſelf up to where the water impels it.

The ſenſes of fiſhes are remarkably imperfect, and, indeed, that of ſight is almoſt the only one which, in general,

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* Thoſe near the gills. † The belly fins. ‡ Back fins.

ral, they may be truly ſaid to poſſeſs. But this is, in ſome degree, compenſated by their aſtoniſhing longevity, ſeveral ſpecies being known to live for more than an hundred years. Their longevity is ſtill exceeded by their ſingular fecundity; for a ſingle cod, for inſtance, produces at a birth, as many young ones as there are inhabitants in all Great-Britain, above nine millions. The flounder produces at once above a million, and the mackarel five hundred thouſand.

The ſpawn continues in its egg ſtate in ſome fiſhes longer than in others, and this generally in proportion to their ſize. The young of the ſalmon continues in egg from December to April; the carp, three weeks, and the little gold-fiſh, from China, is produced ſtill quicker. The young ſpawn are the prey of all the inhabitants of the water, even of their own parents, and ſcarcely one in a thouſand eſcapes the numerous perils of its youth.

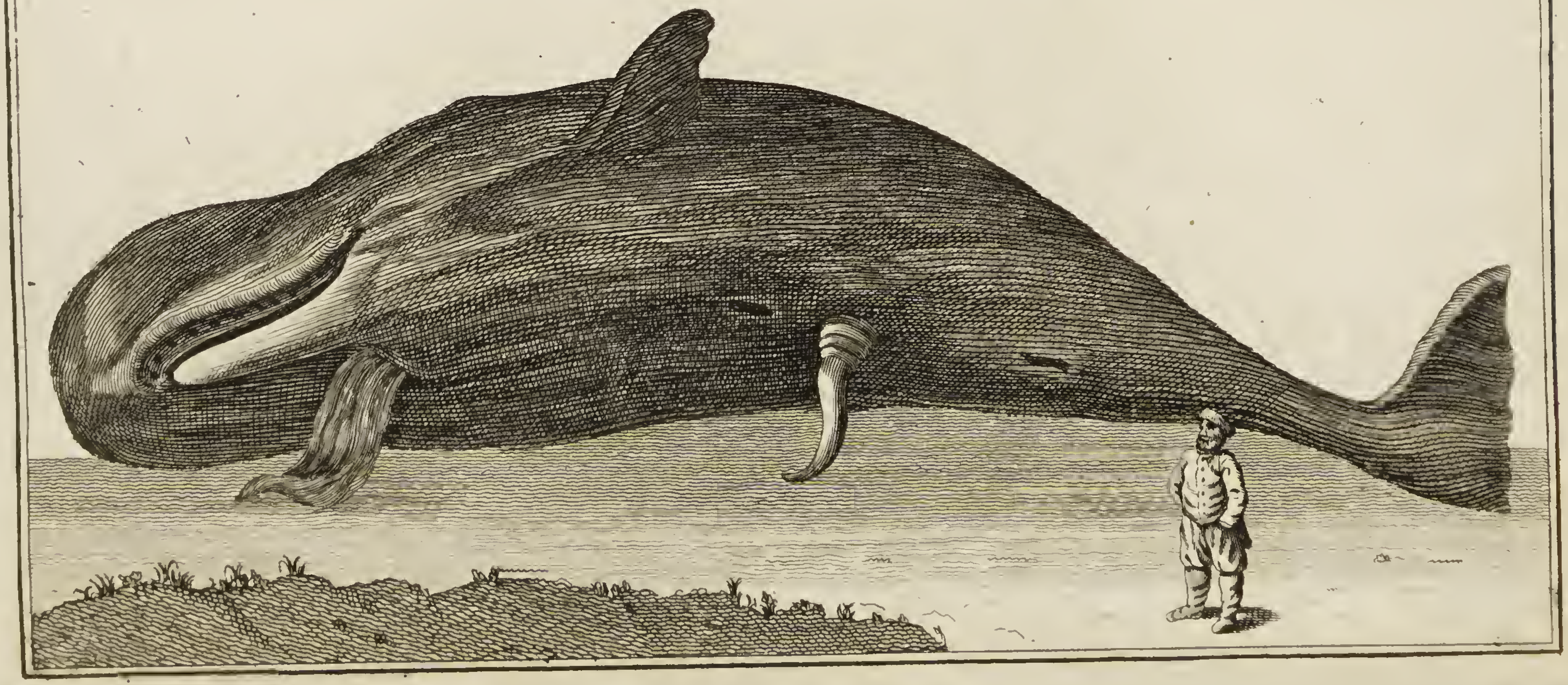
Such is the general picture of theſe heedleſs and hungry creatures; but there are ſome in this claſs, living in the waters, that are poſſeſſed of finer organs and higher ſenſations; that have all the tenderneſs of birds or quadrupeds for their young; that nurſe them with conſtant care, and protect them from every injury. Of this claſs are the *Cetaceous* order, or the fiſhes of the whale kind. There are others, though not capable of nurſing their young, yet that bring them alive into the world, and defend them with courage and activity. Theſe are the *Cartilaginous* kinds, or thoſe which have griſtles inſtead of bones. But the fierce unmindful tribe we have been deſcribing, that leave their ſpawn without any protection, are called the *Spinous* or bony kinds, from their bones reſembling the ſharpneſs of thorns.

Of Cetaceous Fiſhes.

This tribe is compoſed of the *Whale*, the *Cachalot*, the *Dolphin*, the *Grampus*, and the *Porpeſſe*. All theſe reſemble quadrupeds in their internal ſtructure, and in ſome of their appetites and affections. Like quadrupeds, they have lungs, a midriff, a ſtomach, inteſtines, liver, ſpleen, bladder, and parts of generation; their heart alſo reſembles that of quadrupeds, with its partitions cloſed up as in them, and driving red and warm blood in circulation through the body; and to keep theſe parts warm, the whole kind are alſo covered between the ſkin and the muſcles with a thick coat of fator blubber.

Plate .76.

Whale p.151.



As theſe animals breathe the air, it is obvious that they cannot bear to be any long time under water. They are conſtrained, therefore, every two or three minutes, to come up to the ſurface to take breath, as well as to ſpout out through their noſtril, for they have but one, that water which they ſucked in while gaping for their prey.

But it is in the circumſtances in which they continue their kind, that theſe animals ſhew an eminent ſuperiority. Other fiſh depoſit their ſpawn, and leave the ſucceſs to accident: theſe never produce above one young, or two at the moſt; and this the female ſuckles entirely in the manner of quadrupeds, her breaſts being placed, as in the human kind, above the navel. Their tails alſo are different from thoſe of all other fiſh: they are placed ſo as to lie flat on the ſurface of the water; while the other kinds have them, as we every day ſee, upright or edgeways. This flat poſition of the tail enables them to force themſelves ſuddenly to the ſurface of the water to breathe, which they are continually conſtrained to do.

THE WHALE [See pl. LXXVI.] Of the whale, properly ſo called, there are no leſs than ſeven different kinds; all diſtinguiſhed from each other by their external figure, or internal conformation. The *Great Greenland Whale*, without a back-fin, and black on the back; the *Iceland Whale*, without a back-fin, and whitiſh on the back; the *New England Whale*, with a hump on the back; the *Whale with ſix humps* on the back; the *Fin Fiſh*, with a fin on the back near the tail; the *Pike-headed Whale*, and the *Round-lipped Whale*. All theſe differ from each other in figure, as their names obviouſly imply. They differ alſo ſomewhat in their manner of living; the fin-fiſh having a larger ſwallow than the reſt; being more active, ſlender, and fierce, and living chiefly upon herrings.

The *Great Greenland Whale* is the fiſh, for taking which there are ſuch preparations made in different parts of Europe. It is a large heavy animal, and the head alone makes a third of its bulk. It is uſually found from ſixty to ſeventy feet long. The fins on each ſide are from five to eight feet, compoſed of bones and muſcles, and ſufficiently ſtrong to give the great maſs of body which they move, ſpeed, and activity. The tail is about twenty-four feet broad; and, when the fiſh lies on one ſide, its blow is tremendous. The ſkin is ſmooth and black, and, in ſome places, marbled with white and yellow; which, running over the ſurface, has a very beautiful effect.

The outward or ſcarf ſkin of the whale is no thicker than parchment; but this removed, the real ſkin appears, of about an inch thick, and covering the fat or blubber that lies beneath: this is from eight to twelve inches in thickneſs; and is, when the fiſh is in health, of a beautiful yellow. The muſcles lie beneath: and theſe, like the fleſh of quadrupeds, are very red and tough.

The cleft of the mouth is above twenty feet long, which is near one third of the animal's whole length; and the upper jaw is furniſhed with barbs, that lie, like the pipes of an organ, the greateſt in the middle, and the ſmalleſt on the ſides. Theſe compoſe the whale-bone, the longeſt ſpars of which are found to be not leſs than eighteen feet. The tongue is almoſt immoveably fixed to the lower jaw, ſeeming one great lump of fat; and, in fact, it fills ſeveral hogſheads with blubber. The eyes are not larger than thoſe of an ox; and when the cryſtalline humour is dried, it does not appear larger than a pea. They are placed towards the back of the head, being the moſt convenient ſituation for enabling them to ſee both before and behind; as alſo to ſee over them, where their food is principally found. They are guarded by eye-lids and eye-laſhes, as in quadrupeds; and they ſeem to be very ſharp-ſighted.

Nor is their ſenſe of hearing in leſs perfection; for they are warned, at great diſtances, of any danger preparing againſt them. We have already obſerved, that the ſubſtance, called whalebone, is taken from the upper jaw of the animal, and is very different from the real bones of the whale. The real bones are hard, like thoſe of great land animals, are very porous, and filled with marrow. Two great ſtrong bones ſuſtain the under lip, lying againſt each other in the ſhape of an half-moon; ſome of theſe are twenty feet long; they are ſeen in ſeveral gardens ſet up againſt each other, and are uſually miſtaken for the ribs.

The fidelity of theſe animals to each other exceeds whatever we are told of even the conſtancy of birds. Some fiſhers, as Anderſon informs us, having ſtruck one of two whales, a male and a female, that were in company together, the wounded fiſh made a long and terrible reſiſtance: it ſtruck down a boat with three men in it, with a ſingle blow of the tail, by which all went to the bottom. The other ſtill attended its companion, and lent it every aſſiſtance;

ance; till, at laſt, the fiſh that was ſtruck, ſunk under the number of its wounds; while its faithful aſſociate, diſdaining to ſurvive the loſs, with great bellowing, ſtretched itſelf upon the dead fiſh, and ſhared his fate.

The whale goes with young nine or ten months, and is then fatter than uſual, particularly when near the time of bringing forth. The young ones continue at the breaſt for a year; during which time they are called by the ſailors *ſhort-heads*. They are then extremely fat, and yield above fifty barrels of blubber. The mother, at the ſame time, is equally lean and emaciated. At the age of two years they are called *ſtunts*, as they do not thrive much immediately after quitting the breaſt: they then yield ſcarce above twenty, or twenty-four, barrels of blubber: from that time forward they are called *ſkull-fiſh*, and their age is wholly unknown. The food of the whale is a ſmall inſect which is ſeen floating in thoſe ſeas, and which Linnæus terms the Meduſa. Theſe inſects are black, and of the ſize of a ſmall bean, and are ſometimes ſeen floating in cluſters on the ſurface of the water. They are of a round form, like ſnails in a box, but they have wings, which are ſo tender that it is ſcarce poſſible to touch them without breaking. Theſe, however, ſerve rather for ſwimming than flying. They have the taſte of raw muſcles, and have the ſmell of burnt ſugar. Inoffenſive as the whale is, it is not without enemies. There is a ſmall animal, of the ſhell-fiſh kind, called the Whale-louſe, that ſticks to its body, as we ſee ſhells ſticking to the foul bottom of a ſhip. This inſinuates itſelf chiefly under the fins; and whatever efforts the great animal makes, it ſtill keeps its hold, and lives upon the fat, which it is provided with inſtruments to arrive at.

The ſword-fiſh, however, is the whale's moſt terrible enemy. “At the ſight of this little animal,” ſays Anderſon, “the whale ſeems agitated in an extraordinary “manner; leaping from the water as if with affright: “wherever it appears, the whale perceives it at a diſtance, “and flies from it in the oppoſite direction. I have been “myſelf,” continues he “a ſpectator of their terrible “encounter. The whale has no inſtrument of defence “except the tail; with that it endeavours to ſtrike the “enemy; and a ſingle blow taking place, would ef“fectually deſtroy its adverſary: but the ſword-fiſh is as “active as the other is ſtrong, and eaſily avoids the ſtroke; “then bounding into the air, it falls upon its enemy, and "endeavours not to pierce with its pointed beak, but to "cut with its toothed edges. The ſea all about is ſoon "dyed with blood, proceeding from the wounds of the "whale; while the enormous animal vainly endeavours to "reach its invader, and ſtrikes with its tail againſt the "ſurface of the water, making a report at each blow "louder than the noiſe of a cannon."

There is ſtill another and more powerful enemy called, by the fiſhermen of New England, the killer. This is itſelf ſuppoſed to be a cetaceous animal, armed with ſtrong and powerful teeth. A number of theſe are ſaid to ſurround the whale, in the ſame manner as dogs get round a bull. Some attack it with their teeth behind; others attempt it before: until, at laſt, the great animal is torn down, and its tongue is ſaid to be the only part they devour when they have made it their prey. They are ſaid to be of ſuch great ſtrength, that one of them alone was known to ſtop a dead whale that ſeveral boats were towing along, and drag it from among them to the bottom.

But of all the enemies of theſe enormous fiſhes, man is the greateſt: he alone deſtroys more in a year than the reſt in an age, and actually has thinned their numbers in that part of the world where they are chiefly ſought. At the firſt diſcovery of Greenland, whales not being uſed to be diſturbed, frequently came into the very bays, and were accordingly killed almoſt cloſe to the ſhore; ſo that the blubber being cut off was immediately boiled into oil on the ſpot. The ſhips in thoſe times took in nothing but the pure oil and the whalebone, and all the buſineſs was executed in the country; by which means a ſhip could bring home the product of many more whales than ſhe can according to the preſent method of conducting this trade. The fiſhery alſo was then ſo plentiful, that they were obliged ſometimes to ſend other ſhips to fetch off the oil they had made, the quantity being more than the fiſhing ſhips could bring away. But time and change of circumſtances have ſhifted the ſituation of this trade. The ſhips coming in ſuch numbers from Holland, Denmark, Hamburgh, and other northern countries, all intruders upon the Engliſh, who were the firſt diſcoverers of Greenland, the whales were diſturbed, and gradually, as other fiſh often do, forſaking the place, were not to be killed ſo near the ſhore as before; but are now found, and have been ſo ever ſince, in the openings and ſpace among the ice, where they have deep water, and where they go ſometimes a great many leagues from the ſhore.

The whale-fiſhery begins in May, and continues all June and July; but whether the ſhips have good or bad ſucceſs, they muſt come away, and get clear of the ice, by the end of Auguſt; ſo that in the month of September at fartheſt they may be expected home; but a ſhip that meets with a fortunate and early fiſhery in May may return in June or July.

The manner of taking whales at preſent is as follows.—Every ſhip is provided with ſix boats, to each of which belong ſix men for rowing the boat, and an harpooner, whoſe buſineſs is to ſtrike the whale with his harpoon. Two of theſe boats are kept conſtantly on the watch at ſome diſtance from the ſhip, faſtened to pieces of ice, and are relieved by others every four hours. As ſoon as a whale is perceived, both the boats ſet out in purſuit of it, and if either of them can come up before the whale finally deſcends, which is known by his throwing up his tail, the harpooner diſcharges his harpoon at him. There is no difficulty in chooſing the place where the whale is to be ſtruck, as ſome have aſſerted; for theſe creatures only come up to the ſurface in order to ſpout up the water, or *blow*, as the fiſhermen term it, and therefore always keep the ſoft and vulnerable part of their bodies above water. A late improvement was made in the method of diſcharging the harpoon; namely, by ſhooting it out of a kind of ſwivel or muſquetoon: but it does not appear, that ſince this improvement was made, the whale-fiſhing ſhips have had better ſucceſs than before.—As ſoon as the whale is ſtruck, the men ſet up one of their oars in the middle of the boat as a ſignal to thoſe in the ſhip. On perceiving this, the watchman alarms all the reſt with the cry of *fall! fall!* upon which all the other boats are immediately ſent out to the aſſiſtance of the firſt.

The whale finding himſelf wounded, runs off with prodigious violence. Sometimes he deſcends perpendicularly; at others goes off horizontally, at a ſmall depth below the ſurface. The rope which is faſtened to the harpoon is about 200 fathoms long, and properly coiled up, that it may freely be given out as there is a demand for it. At firſt, the velocity with which this line runs over the ſide of the boat is ſo great, that it is wetted to prevent its taking fire: but in a ſhort time the ſtrength of the whale begins to fail, and the fiſhermen, inſtead of letting out more rope, ſtrive as much as poſſible to pull back what is given out already, though they always find themſelves neceſſitated to yield at laſt to the efforts of the animal, to prevent his ſinking their boat. If he runs out the 200 fathoms of line contained in one boat, that belonging to another is immediately faſtened to the end of the firſt, and ſo on; and there have been inſtances, where all the rope belonging to the ſix boats has been neceſſary, though half that quantity is ſeldom required. The whale cannot ſtay long below water, but again comes up to blow; and being now much fatigued and wounded, ſtays longer above water than uſual. This gives another boat time to come up with him, and he is again ſtruck with an harpoon. He again deſcends, but with leſs force than before; and when he comes up again, is generally incapable of deſcending, but ſuffers himſelf to be wounded and killed with long lances which the men are provided with for the purpoſe. He is known to be near death when he ſpouts up the water deeply tinged with blood.

The whale being dead, is laſhed along-ſide the ſhip. They then lay it on one ſide, and put two ropes, one at the head, and the other in the place of the tail, which, together with the fins, is ſtruck off as ſoon as he is taken, to keep theſe extremities above water. On the off-ſide of the whale are two boats, to receive the pieces of fat, utenſils, and men, that might otherwiſe fall into the water on that ſide. Theſe precautions being taken, three or four men with irons at their feet, to prevent ſlipping, get on the whale, and begin to cut out pieces of about three feet thick and eight long, which are hauled up at the capſtan or windlaſs. When the fat is all got off, they cut off the whiſkers of the upper jaw with an ax. Before they cut, they are all laſhed to keep them firm; which alſo facilitates the cutting, and prevents them from falling into the ſea: when on board, five or ſix of them are bundled together, and properly ſtowed; and after all is got off, the carcaſe is turned a-drift, and devoured by the bears, who are very fond of it. In proportion as the large pieces of fat are cut off, the reſt of the crew are employed in ſlicing them ſmaller, and picking out all the lean. When this is prepared, they ſtow it under the deck, where it lies till the fat of all the whales is on board; then cutting it ſtill ſmaller, they put it up in caſks in the hold, cramming them very full and cloſe. Nothing now remains but to ſail homewards, where the fat is to be boiled and melted down into train-oil.

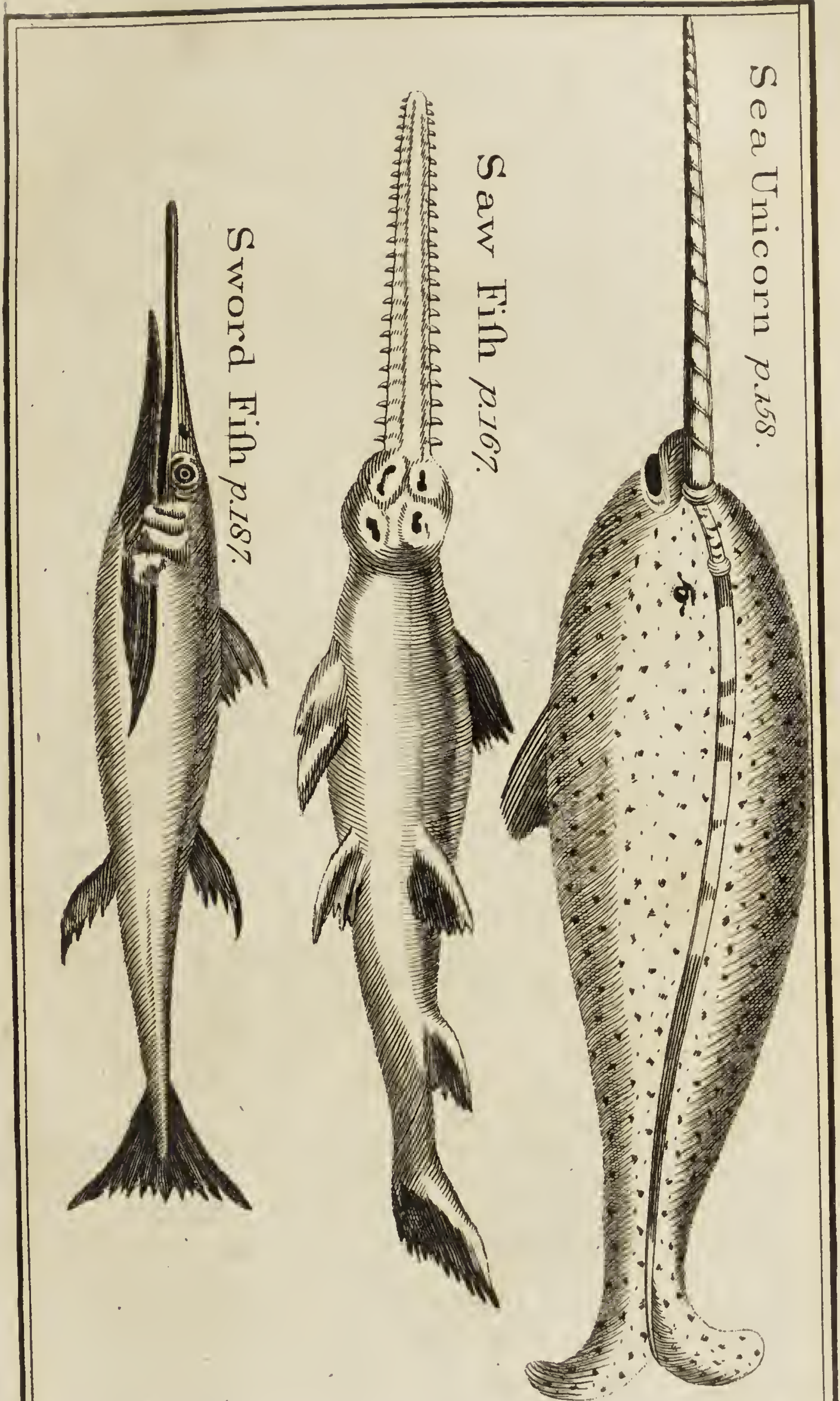
It were in vain to ſpeak in this place of the advantages that may be derived to Great Britain from the whale-fiſhery. We ſhall only remark, that the legiſlature, juſtly conſidering that trade as of great national importance, beſtowed upon it at different periods very conſiderable encouragements. In particular, every Britiſh veſſel of 200 tons or upwards, bound to the Greenland ſeas on the whale-fiſhery, if found to be duly qualified according to the act, obtained a licence from the commiſſioners of the cuſtoms to proceed on ſuch voyage: and on the ſhip's return, the maſter and mate making oath that they proceeded on ſuch voyage and no other, and uſed all their endeavours to take whales, &c. and that all the whale-fins, blubber, oil, &c, imported in their ſhip, were taken by their crew in thoſe ſeas, there was allowed 40 s. for every ton according to the admeaſurement of the ſhip.

It was afterwards found, however, that ſo great a bounty was neither neceſſary to the ſucceſs of the trade, nor expedient with regard to the public. In 1786, therefore, the acts conferring the ſaid emoluments being upon the point of expiring, the ſubject was brought under the conſideration of parliament; and it was propoſed to continue the former meaſures, but with a reduction of the bounty from 40 s. to 30 s. In propoſing this alteration, it was ſtated, "that the ſums which this country had paid in bounties for the Greenland fiſhery amounted to L. 1,265,461; that, in the laſt year, we had paid L. 94,858; and that, from the conſequent deduction of the price of the fiſh, the public at preſent paid 60 *per cent.* upon every cargo. In the Greenland fiſhery there were employed 6000 ſeamen, and theſe ſeamen coſt government L. 13. 10s. per man *per annum*, though we were never able to obtain more than 500 of that number to ſerve on board our ſhips of war. Beſides, the vaſt encouragement given to the trade had occaſioned ſuch a glut in the market, that it was found neceſſary to export conſiderable quantities; and thus we paid a large ſhare of the purchaſe-money for foreign nations, as well as for our own people, beſides ſupplying them with the materials of ſeveral important manufactures." This propoſition was oppoſed by ſeveral members, but was finally carried; and the propriety of the meaſure became very ſoon apparent. At that time (1786) the number of ſhips employed from England in the whale-fiſhery to Davis's Straits and the Greenland ſeas amounted to 139, beſides 15 from Scotland. The propoſed alteration took place the next year (1787); and notwithſtanding the diminution of the bounty, the trade increaſed; the number of ſhips employed the ſame year from England amounting to 217; and the next year (1788) to 222.

The fleſh of this animal is a dainty to ſome nations; and the ſavages of Greenland, as well as thoſe near the ſouth pole, are fond of it to diſtraction. They eat the fleſh, and drink the oil, which is a firſt-rate delicacy. The finding a dead whale is an adventure conſidered among the fortunate circumſtances of their wretched lives. They make their abode beſide it; and ſeldom remove till they have left nothing but the bones.

THE NARWHAL, OR SEA-UNICORN (See pl. LXXVII.) is not ſo large as the whale, not being above ſixty feet long. Its body is ſlenderer than that of the whale, and its fat not in ſo great abundance. But this great animal is ſufficiently diſtinguiſhed from all others of the deep by its tooth or teeth, which ſtand pointing directly forward from the upper jaw, and are from nine to fourteen feet long. In all the variety of weapons with which Nature has armed her various tribes, there is not one ſo large or ſo formidable as this. This terrible weapon is generally found ſingle; and ſome are of opinion that the animal is furniſhed with but one by nature; but there is at preſent the ſkull of a narwhal at the Stadthouſe at Amſterdam with two teeth. The tooth, or, as ſome are pleaſed to call it, the horn of the narwhal, is as ſtraight as an arrow, about the thickneſs of the ſmall of a man's leg, wreathed in the manner we ſometimes ſee twiſted bars of iron; it tapers to a ſharp point; and is whiter, heavier, and harder than ivory. It is generally ſeen to ſpring from the left ſide of the head directly forward in a ſtraight line with the body; and its root enters into the ſocket above a foot and an half. Notwithſtanding its appointments for combat, theſe long and pointed tuſks, amazing ſtrength, and unmatchable celerity, the narwhal is one of the moſt harmleſs and peaceful inhabitants of the ocean. It is ſeen conſtantly and inoffenſively ſporting among the other great monſters of the deep, no way attempting to injure them,

Plate 77.


Sea Unicorn p.158.
Saw Fiſh p.167.
Sword Fiſh p.187.

them, but pleaſed in their company. The Greeenlanders call the narwhal the fore-runner of the whale; for wherever it is ſeen, the whale is ſhortly after ſure to follow. This may ariſe as well from the natural paſſion for ſociety in theſe animals, as from both living upon the ſame food, which are the inſects deſcribed in the preceding ſection. Theſe powerful fiſhes make war upon no other living creature; and, though furniſhed with inſtruments to ſpread general deſtruction, are as innocent and as peaceful as a drove of oxen. The narwhal is much ſwifter than the whale, and would never be taken by the fiſhermen but for thoſe very tuſks, which at firſt appear to be its principal defence. Theſe animals, are always ſeen in herds of ſeveral at a time; and whenever they are attacked, they crowd together in ſuch a manner, that they are mutually embarraſſed by their tuſks. By theſe they are often locked together, and are prevented from ſinking to the bottom. It ſeldom happens, therefore, but the fiſhermen make ſure of one or two of the hindmoſt, which very well reward their trouble.

THE CACHALOT, OR SPERMACETI WHALE, has ſeveral teeth in the under jaw, but none in the upper. As there are no leſs than ſeven diſtinctions among whales, ſo alſo there are the ſame number of diſtinctions in the tribe we are deſcribing. This tribe is not of ſuch enormous ſize as the whale, properly ſo called, not being above ſixty feet long and ſixteen feet high. In conſequence of their being more ſlender, they are much more active than the common whale; they remain a longer time at the bottom, and afford a ſmaller quantity of oil. As in the common whale the head was ſeen to make a third part of its bulk, ſo in this ſpecies the head is ſo large as to make one half of the whole. The cachalot is as deſtructive among leſſer fiſhes as the whale is harmleſs; and can at one gulp ſwallow a ſhoal of fiſhes down its enormous gullet. Linnæus tells us that this fiſh purſues and terrifies the dolphins and porpeſſes ſo much, as often to drive them on ſhore.

But, how formidable ſoever this fiſh may be to its fellows of the deep, it is by far the moſt valuable, and the moſt ſought after by man, as it contains two very precious drugs, ſpermaceti and ambergriſe, the whole oil of the fiſh is very eaſily convertible into ſpermaceti. This is performed by boiling it with a lye of pot-aſh, and hardening

ing it in the manner of ſoap. Candles are now made of it, which are ſubſtituted for wax, and ſold much cheaper.

As to the ambergriſe which is ſometimes found in this whale, it was long conſidered as a ſubſtance found floating on the ſurface of the ſea; but time, that reveals the ſecrets of the mercenary, has diſcovered that it chiefly belongs to this animal. The name, which has been improperly given to the former ſubſtance, ſeems more juſtly to belong to this; for the ambergriſe is found in the place where the ſeminal veſſels are uſually ſituated in other animals. It is found in a bag of three or four feet long, in round lumps, from one to twenty pounds weight, floating in a fluid rather thinner than oil, and of a yellowiſh colour. There are never ſeen more than four at a time in one of theſe bags; and that which weighed twenty pounds, and which was the largeſt ever ſeen, was found ſingle. Theſe balls of ambergriſe are not found in all fiſhes of this kind, but chiefly in the oldeſt and ſtrongeſt.

In (pl. LXXVIII.) is given a print of the blunt-headed chachalot. The animal from which this repreſentation was taken, was fifty-four feet in length. Its greateſt circumference was juſt beyond the eyes, and was thirty feet. The upper jaw was five feet longer than the lower, which was ten feet. The head was above one third the ſize of the fiſh. The end of the upper jaw was blunt, and near nine feet high, the ſpout hole was placed near the end of it. The teeth were placed in the lower jaw, twenty-three on each ſide, all pointing outwards, and in the upper jaw, oppoſite, were a number of holes to receive them when the mouth was cloſed; they were about eighteen inches long.

THE GRAMPUS, THE DOLPHIN (See pl. LXXIX.) AND THE PORPESSE.] All theſe fiſh have teeth both in the upper and lower jaw, and are much leſs than the whale. The grampus, which is the largeſt, never exceeds twenty feet. It may alſo be diſtinguiſhed by the flatneſs of its head, which reſembles a boat turned upſide down. The porpeſſe reſembles the grampus in moſt things, it is ſeldom above eight feet long; its ſnout alſo more reſembles that of an hog. The dolphin has a ſtrong reſemblance to the porpeſſe, except that its ſnout is longer and more pointed. They have all fins on the back; they all have heads very large, like the reſt of the whale kind; and reſemble each other in their appetites, their manners, and conformations; being equally voracious, active, and roving.

The great agility of theſe animals prevents their often being taken. They ſeldom remain a moment above water; ſometimes, indeed, their too eager purſuits expoſe them to danger; and a ſhoal of herrings often allures them out of their depth. In ſuch a caſe, the hungry animal continues to flounder in the ſhallows till knocked on the head, or till the retiring tide ſeaſonably comes to its relief. But all this tribe, and the dolphin in particular, are not leſs ſwift than deſtructive. No fiſh could eſcape them, but from the awkward poſition of the mouth, which is placed in a manner under the head: yet, even with theſe diſadvantages, their depredations are ſo great, that they have been juſtly ſtiled the plunderers of the deep.

As for the reſt, we are told, that theſe animals go with young ten months; that, like the whale, they ſeldom bring forth above one at a time, and that in the midſt of ſummer: that they live to a conſiderable age; though ſome ſay not above twenty-five or thirty years; and they ſleep with the ſnout above water.

CHAP XXX.

Of cartilaginous fiſhes—Of the SHARK—*The white ſhark, The blue, The long-tailed, The baſking, The hammer-headed and the angel Shark—The Dogfiſh and its varieties—The Sawfiſh—The* RAY—*The Skate—The Roughray—The Thornback—Manner of fiſhing for flat fiſh—The Sting Ray—The Torpedo—The Sea Devil—The Sea Eagle—The* LAMPREY—*The* STURGEON—*The Iſinglaſs fiſh—The* ANGLER—*The* DIODON *or Sun fiſh—The oblong, ſhort, and globe Diodon—The Lump*-SUCKER—*The Sea Snail—The* PIPE FISH—*The* HIPPOCAMPUS—*The Sea* PORCUPINE—*The* GALLEY FISH.

Cartilaginous Fiſhes.

THE firſt great diſtinction which the cartilaginous tribe of fiſhes exhibit is, in having cartilages or griſtles inſtead of bones. The ſize of all fiſhes encreaſes with age; but from the pliancy of the bones in this tribe, they ſeem to have no bounds placed to their dimenſions: and it is ſuppoſed that they grow larger every day till they die.

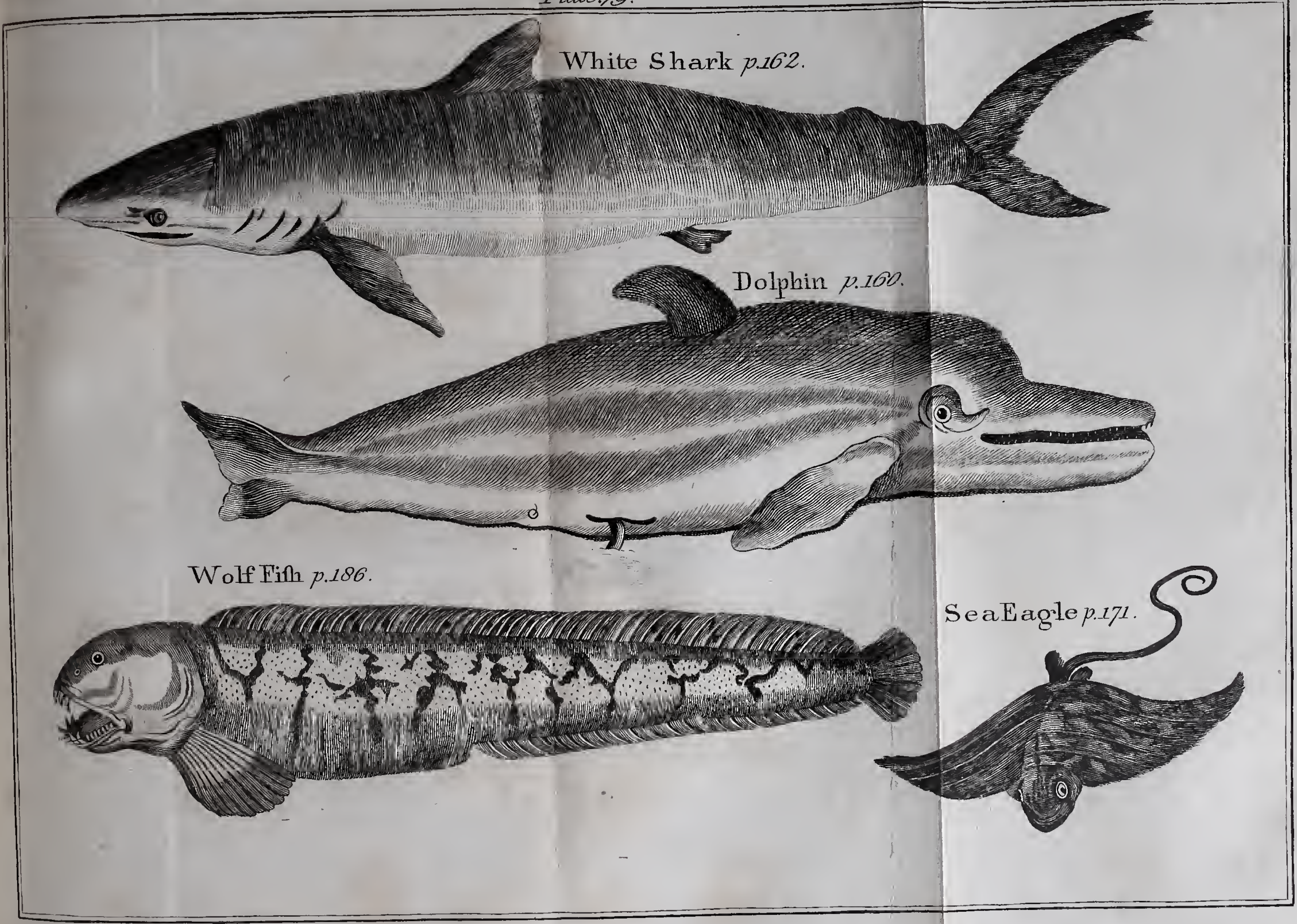
Cartilaginous fiſhes unite the principal properties of both the other claſſes in their comformation: like the cetaceous tribes, they have organs of hearing, and lungs: like the ſpinous kinds, they have gills, and an heart without a partition.

From this ſtructure of their gills, theſe animals are enabled to live a longer time out of water than other fiſhes. The cartilaginous ſhark, or ray, live ſome hours after they are taken; while the ſpinous herring or mackarel expire a few minutes after they are brought on ſhore. Some of this claſs bring forth their young alive; and ſome bring forth eggs, which are afterwards brought to maturity. In all, however, the manner of geſtation is nearly the ſame; for upon diſſection, it is ever found, that the young, while in the body, continue in the egg till a very little time before they are excluded: theſe eggs they may properly be ſaid to hatch within their body; and as ſoon as their young quit the ſhell, they begin to quit the womb alſo.

The Shark.] Of all the inhabitants of the deep, thoſe of the ſhark kind are the fierceſt and the moſt voracious.

The *White Shark* (See pl. LXXIX.) is ſometimes ſeen to rank even among whales for magnitude; and is found from twenty to thirty feet long. Some aſſert that they have ſeen them of four thouſand pound weight; and we are told particularly of one, that had a human corpſe in his belly. The head is large, and ſomewhat flatted; the ſnout long, and the eyes large. The mouth is enormouſly wide; as is the throat, and capable of ſwallowing a man with great eaſe. But its furniture of teeth is ſtill more terrible. Of theſe there are ſix rows, extremely hard, ſharp-pointed, and of a wedge-like figure. It is aſſerted that there are ſeventy-two in each jaw, which make one hundred and forty-four in the whole; yet others think that their number is uncertain; and that, in proportion as the animal grows older, theſe terrible inſtruments of deſtruction are found to encreaſe. With theſe the jaws both above and below appear planted all over;

Plate.79.


White Shark p.162.
Dolphin p.160.
Wolf Fiſh p.186.
Sea Eagle p.171.

ever; but the animal has a power of erecting or depreſſing them at pleaſure. When the ſhark is at reſt, they lie quite flat in his mouth: but when he prepares to ſeize his prey, he erects all this dreadful apparatus, by the help of a ſet of muſcles that join them to the jaw; and the animal he ſeizes, dies pierced with an hundred wounds in a moment.

Nor is this fiſh leſs terrible to behold as to the reſt of his form: his fins are larger, in proportion; he is furniſhed with great goggle eyes, which he turns with eaſe on every ſide, ſo as to ſee his prey behind him as well as before: and his whole aſpect is marked with a character of malignity: his ſkin alſo is rough, hard and prickly; being that ſubſtance which covers inſtrument caſes, called ſhagreen.

No fiſh can ſwim ſo faſt as the ſhark, he outſtrips the ſwifteſt ſhips. Such amazing powers, with ſuch great appetites for deſtruction, would quickly unpeople even the ocean, but providentially the ſhark's upper jaw projects ſo far above the lower, that he is obliged to turn on one ſide (not on his back, as is generally ſuppoſed) to ſeize his prey. As this takes ſome ſmall time to perform, the animal purſued ſeizes that opportunity to make its eſcape.

Still, however, the depredations he commits are frequent and formidable. The ſhark is the dread of ſailors in all hot climates; where, like a greedy robber, he attends the ſhips, in expectation of what may drop over board. A man who unfortunately falls into the ſea at ſuch a time, is ſure to periſh. A ſailor that was bathing in the Mediterranean, near Antibes, in the year 1744, while he was ſwimming about fifty-yards from the ſhip, perceived a monſtrous fiſh making towards him and ſurveying him on every ſide, as fiſh are often ſeen to look round a bait. The poor man, ſtruck with terror at its approach, cried out to his companions in the veſſel to take him on board. They accordingly threw him a rope with the utmoſt expedition, and were drawing him up by the ſhip's ſide, when the ſhark darted after him from the deep, and ſnapped off his leg.

Mr. Pennant tells us, that the maſter of a Guinea-ſhip, finding a rage for ſuicide prevail among his ſlaves, from a notion the unhappy creatures had, that after death they ſhould be reſtored again to their families, friends and country; to convince them at leaſt that ſome diſgrace ſhould attend them here, he ordered one of their dead bodies to be tied by the heels to a rope, and ſo let down into the ſea; and though it was drawn up again with great ſwiftneſs, yet, in that ſhort ſpace, the ſhark had bitten off all but the feet. A Guinea captain was, by ſtreſs of weather, driven into the harbour of Belfaſt, with a lading of very ſickly ſlaves, who, in the manner above-mentioned, took every opportunity to throw themſelves over board when brought upon deck, as is uſual, for the benefit of the freſh air. The captain perceiving, among others, a woman ſlave attempting to drown herſelf, pitched upon her as a proper example to the reſt: as he ſuppoſed that they did not know the terrors attending death, he ordered the woman to be tied with a rope under the arm-pits, and ſo let her down into the water. When the poor creature was thus plunged in, and about half way down, ſhe was heard to give a terrible ſhriek, which at firſt was aſcribed to her fears of drowning; but ſoon after the water appearing red all round her, ſhe was drawn up, and it was found that a ſhark, which had followed the ſhip, had bit her off from the middle.

The uſual method of our ſailors to take the ſhark, is by baiting a great hook with a piece of beef or pork, which is thrown out into the ſea by a ſtrong cord, ſtrengthened near the hook with an iron chain. Without this precaution, the ſhark would quickly bite the cord in two, and thus ſet himſelf free. It is no unpleaſant amuſement to obſerve this voracious animal coming up to ſurvey the bait, particularly when not preſſed by hunger. He approaches it, examines it, ſwims round it, ſeems for a while to neglect it, perhaps apprehenſive of the cord and the chain: he quits it for a little; but his appetite preſſing, he returns again; appears preparing to devour it, but quits it once more. When the ſailors have ſufficiently diverted themſelves with his different evolutions, they then make a pretence, by drawing the rope, as if intending to take the bait away; it is then that the glutton's hunger excites him; he darts at the bait, and ſwallows it, hook and all. Sometimes, however, he does not ſo entirely gorge the whole, but that he once more gets free; yet even then, though wounded and bleeding with the hook, he will again purſue the bait until he is taken. When he finds the hook lodged in his maw, his utmoſt efforts are then excited, but in vain to get free; he tries with his teeth to cut the chain; he pulls with all his force to break the line; he almoſt ſeems to turn his ſtomach inſide out, to diſgorge the hook; in this manner he continues his formidable though fruitleſs efforts; till quite ſpent, he ſuffers his head to be drawn above water, and the ſailors confining his tail by a nooſe, in this manner draw him on ſhip board, and diſpatch him. This is done by beating him on the head till he dies; yet even that is not effected without difficulty and danger; the enormous creature, terrible even in the agonies of death, ſtill ſtruggles with his deſtroyers; nor is there an animal in the world that is harder to be killed. Even when cut in pieces, the muſcles ſtill preſerve their motion, and vibrate for ſome minutes after being ſeparated from the body. Another method of taking him, is by ſtriking a barbed inſtrument, called a fizgig, into his body, as he bruſhes along by the ſide of the ſhip. As ſoon as he is taken up, to prevent his flouncing, they cut off the tail with an ax, with the utmoſt expedition.

This is the manner in which Europeans deſtroy the ſhark; but ſome of the negroes along the African coaſt, take a bolder and more dangerous method to combat their terrible enemy. Armed with nothing more than a knife, the negroe plunges into the water, where he ſees the ſhark watching for his prey, and boldly ſwims forward to meet him; though the great animal does not come to provoke the combat, he does not avoid it, and ſuffers the man to approach him, but juſt as he turns upon his ſide to ſeize the aggreſſor, the negroe watches the opportunity, plunges his knife in the fiſh's belly, and purſues his blows with ſuch ſucceſs, that he lays the ravenous tyrant dead at the bottom: he ſoon however returns, fixes the fiſh's head in a nooſe, and drags him to ſhore, where he makes a noble feaſt for the adjacent villages.

Nor is man alone the only enemy this fiſh has to fear: the *Remora*, or ſucking fiſh, (See pl. LXXX.) is probably a ſtill greater, and follows the ſhark every where. This fiſh has got a power of adhering to whatever it ſticks againſt, in the ſame manner as a cupping-glaſs ſticks to the human body. It is by ſuch an apparatus that this animal ſticks to the ſhark, drains away its moiſture, and produces a gradual decay.

There are ſeveral other ſpecies of the ſhark. The *Blue Shark* (See pl. LXXX.) is diſtinguiſhed by a fine ſmooth ſkin on its back of a blue colour. The obſervation of Ælian, that the young of this animal when purſued, will take refuge in the belly of its mother, by ſwimming down her mouth, is confirmed by one of the beſt of modern icthyologiſts (Rondeletius.) Mr. Pennant, however, does not apprehend this circumſtance to be peculiar to the Blue Shark, but rather common to the whole genus.

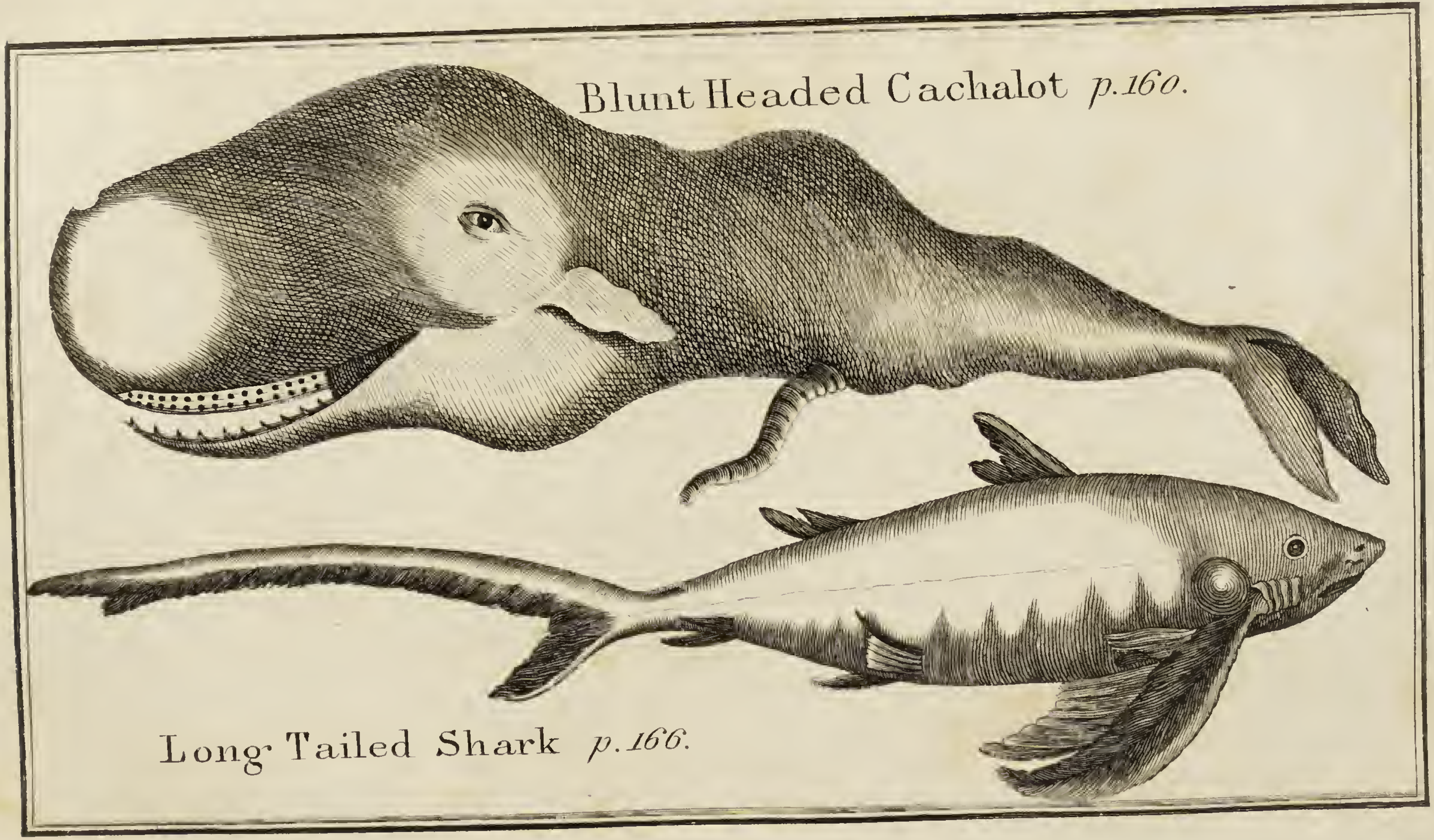
The *Long-tailed Shark* (See pl. LXXVIII.) the author whom we have juſt quoted, mentions the dimenſions of one of theſe animals which will ſerve to give an idea of the general proportions of this ſpecies. The fiſh in queſtion was thirteen feet in length, of which the tail was more than ſix, the upper lobe much longer than the lower. The body was round and ſhort, the noſe ſhort and pointed. The eyes large, and placed immediately over the corners of the mouth. This fiſh was anciently called the *Sea Fox*, from its ſuppoſed cunning.

The *Baſking Shark* has nothing of the rapacious nature of theſe animals, but feeds entirely on ſea plants. They ſometimes viſit our coaſts in the ſummer ſeaſon, when they will lie baſking in the ſun on the ſurface of the water, and are ſo tame as to ſuffer themſelves to be ſtroaked. They are in length from three to twelve yards, and ſometimes even larger.

The *Hammer-headed Shark*, or *Balance Fiſh* (See pl. LXXX.) is an animal of a very peculiar form. The head is placed tranſverſely to the body, like the head of a hammer or mallet. It is terminated at each end by an eye, which is ſo placed that it more conveniently looks downward than either upwards or ſideway. In the farther part of the forehead near the eyes on each ſide there is a large oblong foramen or orifice, ſerving either for hearing or ſmelling, or perhaps for both. The mouth is very large, placed under the head, and armed with four rows of teeth extremely ſharp. The tail conſiſts of two fins one longer than the other. The back is aſh-colour, and the belly white. This fiſh is chiefly caught in the Mediterranean.

The *Angel Shark*, or *Monk Fiſh* isthe animal which connects the Shark genus with that of the Ray, and partakes in ſome degree of the nature of both. It grows to a very large ſize, ſometimes an hundred weight. The head is large, the teeth broad at the baſe, ſlender and ſharp at the point. Like thoſe

Plate 78.



Blunt Headed Cachalot *p.160.*

Long Tailed Shark *p.166.*

of other ſharks, they are capable of being raiſed or depreſſed at the pleaſure of the animal. The eyes are oblong, and placed lengthways in the head. They are ſunk very deep and almoſt covered with the ſkin: and have more the expreſſion of malevolence than of fire or ſpirit.

The ſkin is very rough; the back is of a pale aſh-colour, with a line of large lumps with pointed prickles along it. The pectoral fins are extremely large, and reſemble wings, whence probably it derives the name of angel. This ſpecies of ſhark feeds on flounders and flat fiſh. It is extremely fierce and dangerous to be approached. Mr. Pennant ſpeaks of a fiſherman whoſe leg was terribly torn by one of them as it lay in his net in ſhallow water. It is not unfrequent on all our coaſts.

In this genus are included the ſeveral ſpecies of *Dog Fiſh*, which are common in moſt parts of the world, and retain much of the form and all the habits of the ſhark. Nay, their appetite for human fleſh is ſaid to be ſo great, that they will ſometimes even venture upon the ſhore to gratify this violent propenſity. The moſt remarkable are the *Tope*, which weighs ſometimes ſeventy pounds. The *Spotted Dog-fiſh*; the *Picked Dog-fiſh* which has ſpines on its back fins; the *Smooth Hound*, which is without the ſpines; and the *Porbeagle*.

Authors have claſſed under this genus a ſingular fiſh which is well known in the Weſtern Ocean under the name of the *Saw-fiſh* (See pl. LXXVII.) It is remarkable for a curious inſtrument with which it is furniſhed at the ſnout reſembling a ſaw, and which is ſometimes of the length of five feet. From this circumſtance it is evident that it muſt grow to a very large ſize.

THE RAY.] The whole of this genus reſemble each other very ſtrongly in their figure; nor is it eaſy without experience to diſtinguiſh one from another. The ſtranger to this dangerous tribe may imagine he is only handling a ſkate when he is inſtantly ſtruck numb by the torpedo; and he may ſuppoſe he has caught a thornback till he is ſtung by the fire-ſlare.

It is by the ſpines that theſe animals are diſtinguiſhed from each other. The *ſkate* has the middle of the back rough, and a ſingle row of ſpines on the tail. The *ſharp noſed ray* has ten ſpines that are ſituated towards the middle of the back. The *rough ray* (See pl. LXXX.) has its ſpines ſpread indiſcriminately over the whole back. The *thorn-back* (See pl. LXXXI.) has its ſpines diſpoſed in three rows upon the back. The *ſting ray* or *fire flare* has but one ſpine, but that indeed a terrible one. This dangerous weapon is placed on the tail, about four inches from the body, and is not leſs than five inches long. It is of a flinty hardneſs, the ſides thin, ſharp pointed, and cloſely and ſharply bearded the whole way. The *torpedo* (See pl. LXXI.) has no ſpines that can wound; but in the place of them it is poſſeſſed of one of the moſt potent and extraordinary faculties in nature.

Of all the larger fiſh of the ſea, theſe are the moſt numerous; and they owe their numbers to their ſize. Except the white ſhark and cachalot alone, there is no other fiſh that has a ſwallow large enough to take them in; and their ſpines make them a ſtill more dangerous morſel. Yet the ſize of ſome is ſuch, that even the ſhark himſelf is unable to devour them: we have ſeen ſome of them in England weigh above two hundred pounds; but that is nothing to their enormous bulk in other parts of the world. Labat tells us of a prodigious ray that was ſpeared by the negroes at Guadaloupe, which was thirteen feet eight inches broad, and above ten feet from the ſnout to the inſertion of the tail. The tail itſelf was in proportion, for it was no leſs than fifteen feet long; twenty inches broad at its inſertion, and tapering to a point. The body was two feet in depth; the ſkin as thick as leather, and marked with ſpots, which ſpots in all of this kind, are only glands, that ſupply a mucus to lubricate and ſoften the ſkin. This enormous fiſh was utterly unfit to be eaten by the Europeans; but the negroes choſe out ſome of the niceſt bits, and carefully ſalted them up as a moſt favourite proviſion.

It is chiefly during the winter ſeaſon that our fiſhermen fiſh for the ray; but the Dutch, who are indefatigable, begin their operations earlier, and fiſh with better ſucceſs than we do. The method practiſed by the fiſhermen of Scarborough is thought to be the beſt among the Engliſh; and, as Mr. Pennant has given a very ſuccinct account of it, we ſhall preſent it to the reader.

"When they go out to fiſh, each perſon is provided
"with three lines: each man's lines are fairly coiled upon
"a flat oblong piece of wicker work; the hooks being
"baited and placed very regularly in the centre of the
coil.

“ coil. Each line is furniſhed with two hundred and
“ eighty hooks, at the diſtance of ſix feet two inches from
“ each other. The hooks are faſtened to lines of twiſted
“ horſe-hair, twenty-ſeven inches in length. The line
“ is laid acroſs the current, and always remains upon the
“ ground about ſix hours.

“ The beſt bait for all kinds of fiſh, is freſh herring cut
“ in pieces of a proper ſize. Next to herrings are the leſſer
“ lampreys, which come all winter by land-carriage from
“ Tadcaſter. The next baits in eſteem are ſmall haddocks
“ cut in pieces, ſand-worms, muſcles, and limpets: and
“ laſtly, when none of theſe can be found, they uſe
“ bullock's liver. The hooks uſed there are much
“ ſmaller than thoſe employed at Iceland and Newfound-
“ land; and are two inches and an half long in the
“ ſhank. The line is made of ſmall cording, it is always
“ tanned before it is uſed, and is in length about three
“ miles.”

But this extent of line, is nothing to what the Italians throw out in the Mediterranean. Their fiſhing is carried on in a tartan, which is a veſſel much larger than ours; and they bait a line of no leſs than twenty miles long, with above ten or twelve thouſand hooks. This line is not regularly drawn every ſix hours, as with us, but remains for ſome time in the ſea; and it requires the ſpace of twenty-four hours to take it up. By this apparatus they take rays, ſharks, and other fiſh; ſome of which are above a thouſand pounds weight. When they have caught any of this magnitude, they ſtrike them through with an harpoon, to bring them on board, and kill them as faſt as they can.

This method of catching fiſh is obviouſly fatiguing and dangerous; but the value of the capture generally repays the pain. The ſkate and the thornback are very good food; and their ſize, which is from ten pounds to two hundred weight, very well rewards the trouble of fiſhing for them. But it ſometimes happens that the lines are viſited by very unwelcome intruders; by the rough ray, the fireſlare, or the torpedo.

The rough ray inflicts but ſlight wounds with the prickles with which its whole body is furniſhed. To the ignorant it ſeems harmleſs, and a man would at firſt ſight venture to take it in his hand, without any apprehenſion; but he ſoon finds, that there is not a ſingle part of its body that is not armed with ſpines; and that there is no way of ſeizing the animal, but by the little fin at the end of the tail.

But this animal is harmleſs, when compared to the ſting-ray, or fireflare, which ſeems to be the dread of even the boldeſt and moſt experienced fiſhermen. The ſpine, with which it wounds its adverſaries, is not venomous, as has been vulgarly ſuppoſed, but is, in fact, a weapon of offence belonging to this animal, and capable, from its barbs, of inflicting a very terrible wound, attended with dangerous ſymptoms; it is fixed to the tail, as a quill is into the tail of a fowl, and is annually ſhed in the ſame manner.

The *Torpedo* (See pl. LXXXI.) is equally formidable, and well known with the former; but the manner of its operating, is to this hour a myſtery to mankind. The body of this fiſh is almoſt circular, and thicker than others of the ray kind; the ſkin is ſoft, ſmooth, and of a yellowiſh colour, marked, as all the kind, with large annular ſpots; the eyes very ſmall; the tail tapering to a point; and the weight of the fiſh from a quarter to fifteen pounds. Redi found one twenty-four pounds weight. To all outward appearance, it is furniſhed with no extraordinary powers; it has no muſcles formed for particularly great exertions; no internal conformation perceptibly differing from the reſt of its kind; yet ſuch is that unaccountable power it poſſeſſes, that, the inſtant it is touched, it numbs not only the hand and arm, but ſometimes alſo the whole body. The ſhock received, by all accounts, moſt reſembles the ſtroke of an electrical machine; ſudden, tingling, and painful. "The inſtant," ſays Kempfer, "I "touched it with my hand, I felt a terrible numbneſs in "my arm, and as far up as the ſhoulder. Even if one "treads upon it with the ſhoe on, it affects not only the "leg, but the whole thigh upwards. Thoſe who touch "it with the foot, are ſeized with a ſtronger palpitation "than even thoſe who touch it with the hand. This "numbneſs bears no reſemblance to that which we feel "when a nerve is a long time preſſed, and the foot is "ſaid to be aſleep; it rather appears like a ſudden va-"pour, which, paſſing through the pores in an inſtant, "penetates to the very ſprings of life, whence it "diffuſes itſelf over the whole body, and gives real pain. "The nerves are ſo affected, that the perſon ſtruck "imagines all the bones of his body, and particularly "thoſe of the limb that received the blow, are driven "out of joint. All this is accompanied with an uni-"verſal tremor, a ſickneſs of the ſtomach, a general "convulſion, and a total ſuſpenſion of the faculties of the "mind."

Though we are ignorant of the nature of the torpedo, yet we have ſome facts which relate to the manner of its acting. Reaumur, who made ſeveral trials upon this animal, has at leaſt convinced the world that it is not neceſſarily, but by an effort, that the torpedo numbs the hand of him that touches it. He tried ſeveral times, and could eaſily tell when the fiſh intended the ſtroke, and when it was about to continue harmleſs. Always before the fiſh intended the ſtroke, it flattened the back, raiſed the head and the tail; and then, by a violent contraction in the oppoſite direction, ſtruck with its back againſt the preſſing finger; and the body, which before was flat, became humped and round.

The moſt probable ſolution of this phenomenon is, that it depends upon electricity. When the fiſh is dead, the whole power is deſtroyed, and it may be handled or eaten with perfect ſecurity: It is now known that there are more fiſh than this of the ray kind, poſſeſſed of the numbing quality, which has acquired them the name of the torpedo.

There are two other ſpecies of ray, which for their ſingular form deſerve to be diſtinguiſhed. The firſt is called the *Sea Devil* (See pl. LXXXIII.) Its noſe and ſnout are divided, as it were, into two horns; and its ſides are terminated by the fins. Its ſkin, towards the head, is variegated with duſky ſpots. It grows, ſometimes, to the length of ſix or ſeven feet.

The *Sea Eagle* (See pl. LXXIX.) is another ſpecies of this deformed tribe. It receives its name from its thin and expanded ſides, which reſemble the ſpread wings of an eagle. Its head, in ſome degree, reſembles that of a toad; its eyes are large and prominent. It is generally found ſmall, but is ſaid ſometimes to grow to a very large ſize.

THE LAMPREY (See pl. LXXXII.) There is a ſpecies of the lamprey ſerved up as a great delicacy among the modern Romans very different from ours. Whether theirs be the murena of the ancients we ſhall not pretend to ſay;

but there is nothing more certain than that our lamprey is not.

The lamprey known among us is differently eſtimated, according to the ſeaſon in which it is caught, or the place where it has been fed. Thoſe that leave the ſea to depoſit their ſpawn in freſh waters are the beſt; thoſe that are entirely bred in our rivers, and that have never been at ſea, are conſidered as much inferior to the former. Thoſe that are taken in the months of March, April, or May, juſt upon their leaving the ſea, are reckoned very good; thoſe that are caught after they have caſt their ſpawn, are found to be flabby, and of little value.

The lamprey much reſembles an eel in its general appearance, but is of a lighter colour, and rather a clumſier make. It differs, however, in the mouth, which is round, and placed rather obliquely below the end of the noſe. It more reſembles the mouth of a leech than an eel; and the animal has a hole on the top of the head, through which it ſpouts water, as in the cetaceous kind. There are ſeven holes on each ſide for reſpiration; and the fins are formed rather by a lengthening out of the ſkin, than any ſet of bones or ſpines for that purpoſe. As the mouth is formed reſembling that of a leech, ſo it has a property reſembling that animal, of ſticking cloſe to, and ſucking any body it is applied to. It is extraordinary the power they have of adhering to ſtones; which they do ſo firmly, as not to be drawn off without ſome difficulty. We are told of one that weighed but three pounds; and yet it ſtuck ſo firmly to a ſtone of twelve pounds, that it remained ſuſpended at its mouth; from which it was ſeparated with no ſmall difficulty. As to the inteſtines of the lamprey, it ſeems to have but one great bowel, running from the mouth to the vent, narrow at both ends, and wide in the middle.

So ſimple a conformation ſeems to imply an equal ſimplicity of appetite. In fact, the lamprey's food is either ſlime and water, or ſuch ſmall water-inſects as are ſcarcely perceivable. Perhaps its appetite may be more active at ſea, of which it is properly a native; but when it comes up into our rivers, it is hardly perceived to devour any thing.

Its uſual time of leaving the ſea, which it is annually ſeen to do in order to ſpawn, is about the beginning of ſpring; and after a ſtay of a few months it returns again to the ſea.

Their preparation for ſpawning is peculiar; their manner is, to make holes in the gravelly bottom of rivers; and on this occaſion their ſucking power is particularly ſerviceable; for if they meet with a ſtone of a conſiderable ſize, they will remove it, and throw it out. Their young are produced from eggs in the manner of flat fiſh; the female remains near the place where they are excluded, and continues with them till they come forth. She is ſometimes ſeen with her whole family playing about her; and after ſome time ſhe conducts them in triumph back to the ocean.

There is a ſmall ſpecies of the lamprey, which is called the *Lampern*, and about Oxford, the *Pride* of the Iſis. It is frequently potted by itſelf, and ſometimes along with the larger ſpecies.

The Sturgeon (See pl. LXXXV.) in its general form reſembles a freſh-water pike. The noſe is long; the mouth is ſituated beneath, being ſmall, and without jaw-bones or teeth. But, though it is ſo harmleſs and ill provided for war, the body is formidable enough to appearance. It is long, pentagonal, and covered with five rows of large bony knobs, one row on the back, and two on each ſide, and a number of fins to give it greater expedition. Of this fiſh there are three ſpecies, the *common ſturgeon*, the *caviar ſturgeon*, and the *huſo*, or iſinglaſs fiſh. The largeſt ſturgeon we have heard of caught in Great Britain, was a fiſh taken in the Eſke, where they are moſt frequently found, which weighed four hundred and ſixty pounds. An enormous ſize to thoſe who have only ſeen our freſh-water fiſhes!

As the ſturgeon is an harmleſs fiſh, and no way voracious, it is never caught by a bait in the ordinary manner of fiſhing, but always in nets. From the quality of floundering at the bottom it has received its name; which comes from the German verb *ſtoèren*, ſignifying to wallow in the mud. That it lives upon no large animals is obvious to all thoſe who cut it open, where nothing is found in its ſtomach but a kind of ſlimy ſubſtance, which has induced ſome to think it lives only upon water and air.

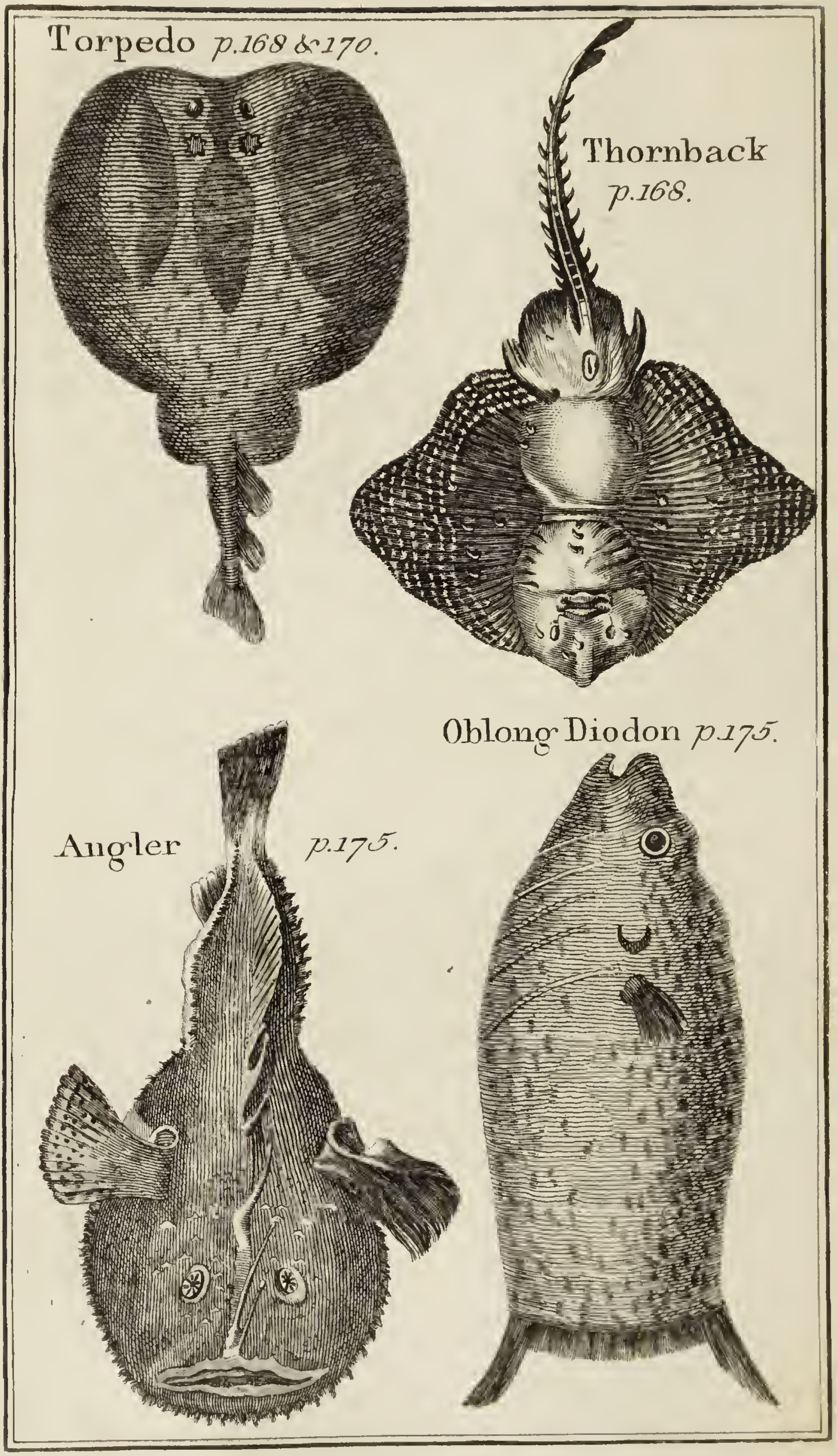
The uſual time for the ſturgeon to come up rivers to depoſit its ſpawn, is about the beginning of ſummer, when the fiſhermen of all great rivers make a regular preparation for its reception. At Pillau particularly the ſhores are formed into diſtricts, and allotted to companies of fiſhermen, ſome of which are rented for about three hundred pounds a year. The nets in which the ſturgeon is caught, are made of ſmall cord, and placed acroſs the mouth of the river; but in ſuch a manner that, whether the tide ebbs or flows, the pouch of the net goes with the ſtream. The ſturgeon thus caught, while in the water, is one of the ſtrongeſt fiſhes that ſwims, and often breaks the net to pieces that encloſes it; but the inſtant it is raiſed with its head above water, all its activity ceaſes; it is then a lifeleſs, ſpiritleſs lump, and ſuffers itſelf to be tamely dragged on ſhore.

The fleſh of this animal pickled is very well known at all the tables of Europe; and is even more prized in England than in any of the countries where it is uſually caught. The fiſhermen have two different methods of preparing it. The one is by cutting it in long pieces lengthwiſe, and having ſalted them, by hanging them up in the ſun to dry: the fiſh thus prepared is ſold in all the countries of the Levant, and ſupplies the want of better prroviſion. The other method, which is uſually practiſed in Holland, and along the ſhores of the Baltic, is to cut the ſturgeon croſswiſe into ſhort pieces, and put it into ſmall barrels, with a pickle made of ſalt and ſaumure. This is the ſturgeon which is ſold in England, and of which great quantities come from the North.

A very great trade is alſo carried on with the roe of the ſturgeon, preſerved in a particular manner, and called Caviar: it is made from the roe of all kinds of ſturgeon, but particularly the ſecond. This is much more in requeſt in other countries of Europe than with us. To all theſe high reliſhed meats, the appetite muſt be formed by degrees; and though formerly even in England it was very much in requeſt at the politeſt tables, it is at preſent ſunk entirely into diſuſe. It is ſtill, however, a conſiderable merchandize among the Turks, Greeks, and Venetians. Caviar ſomewhat reſembles ſoft ſoap in conſiſtence; but it is of a brown, uniform colour, and is eaten as cheeſe with bread.

The *Huſo*, or *Iſinglaſs fiſh*, furniſhes a ſtill more valuable commodity. This fiſh is caught in great quantities in the Danube, from the months of October to January: it is ſeldom under fifty pounds weight, and often above four hundred; its fleſh is ſoft, glutinous, and flabby; but it is ſome-

Plate 81.



Torpedo *p.168 & 170.*

Thornback *p.168.*

Oblong Diodon *p.175.*

Angler *p.175.*

ſometimes ſalted, which makes it better taſted, and then it turns red like ſalmon. It is for the commodity it furniſhes that it is chiefly taken. The manner of making it is this: they take the ſkin, the entrails, the fins, and the tail of this fiſh, and cut them into ſmall pieces; theſe are left to macerate in a ſufficient quantity of warm water, and they are all boiled ſhortly after with a ſlow fire, until they are diſſolved and reduced to a jelly: this jelly is ſpread upon inſtruments made for the purpoſe, ſo that drying, it aſſumes the form of parchment, and, when quite dry, it is then rolled into the form which we ſee it in the ſhops. This valuable commodity is principally furniſhed from Ruſſia, where they prepare great quantities ſurpriſingly cheap.

THE ANGLER, OR FISHING FROG (See pl. LXXXI.) in ſhape very much reſembles a tadpole, or young frog, but of an enormous ſize, for it grows to above five feet long, and its mouth is ſometimes a yard wide. The eyes are placed on the top of the head, and are encompaſſed with prickles: immediately above the noſe are two long beards or filaments, ſmall in the beginning, but thicker at the end, and round: theſe, as it is ſaid, anſwer a very ſingular purpoſe; for being made ſomewhat reſembling a fiſhing-line, it is aſſerted, that the animal converts them to the purpoſes of fiſhing. With theſe extended, the fiſhing frog is ſaid to hide in muddy waters, and leave nothing but the beards to be ſeen; the curioſity of the ſmaller fiſh bring them to view theſe filaments, and their hunger induces them to ſeize the bait; upon which the animal in ambuſh inſtantly draws in its filaments with the little fiſh that had taken the bait, and devours it without mercy. This ſtory, though apparently improbable, has found credit among ſome of our beſt naturaliſts. The fiſhermen have, in general, a great regard for this ugly fiſh, as it is an enemy to the dog fiſh, the bodies of thoſe fierce and voracious animals being often found in its ſtomach: whenever they take it, therefore, they always ſet it at liberty.

THE DIODON, or ſun fiſh, is eaſily diſtinguiſhed by its very peculiar form; having a very deep body, and, as it were, cut off in the middle. There are three well known ſpecies.

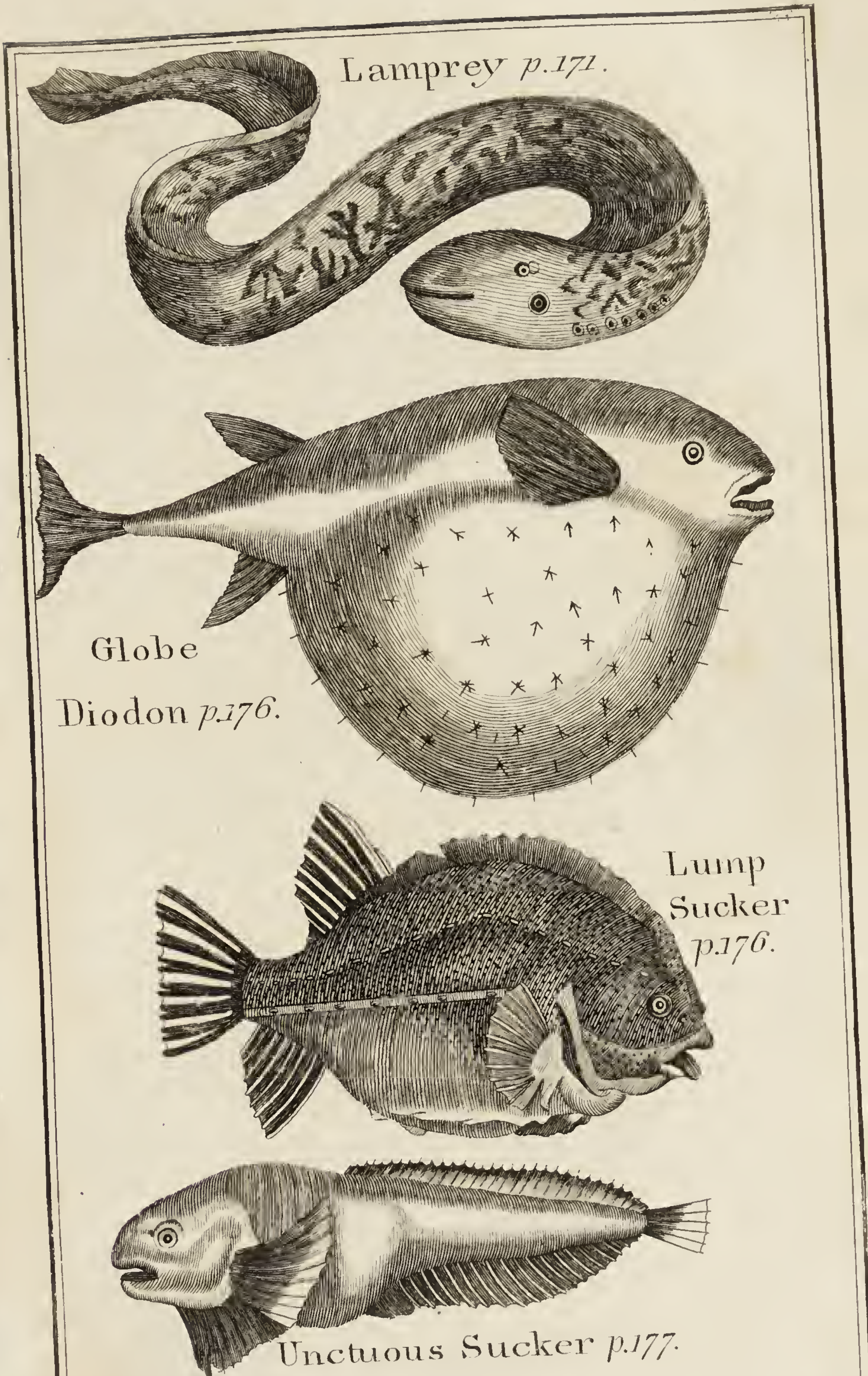
The *Oblong Diodon* (See pl. LXXXI.) grows to an immenſe ſize, and has been known to weigh upwards of five hundred pounds. In its form it reſembles a bream or carp cut off in the middle. The mouth is very ſmall, and contains in each jaw two broad teeth, with ſharp edges. The dorſal, and the anal fins, are placed at the extremity of the body; the tail fin is narrow, and fills up all the ſpace between theſe two fins. When boiled, it is obſerved to turn entirely to a glutinous jelly, and would probably ſerve all the purpoſes of iſinglaſs; but it is not found in ſufficient plenty, at leaſt upon our coaſts.

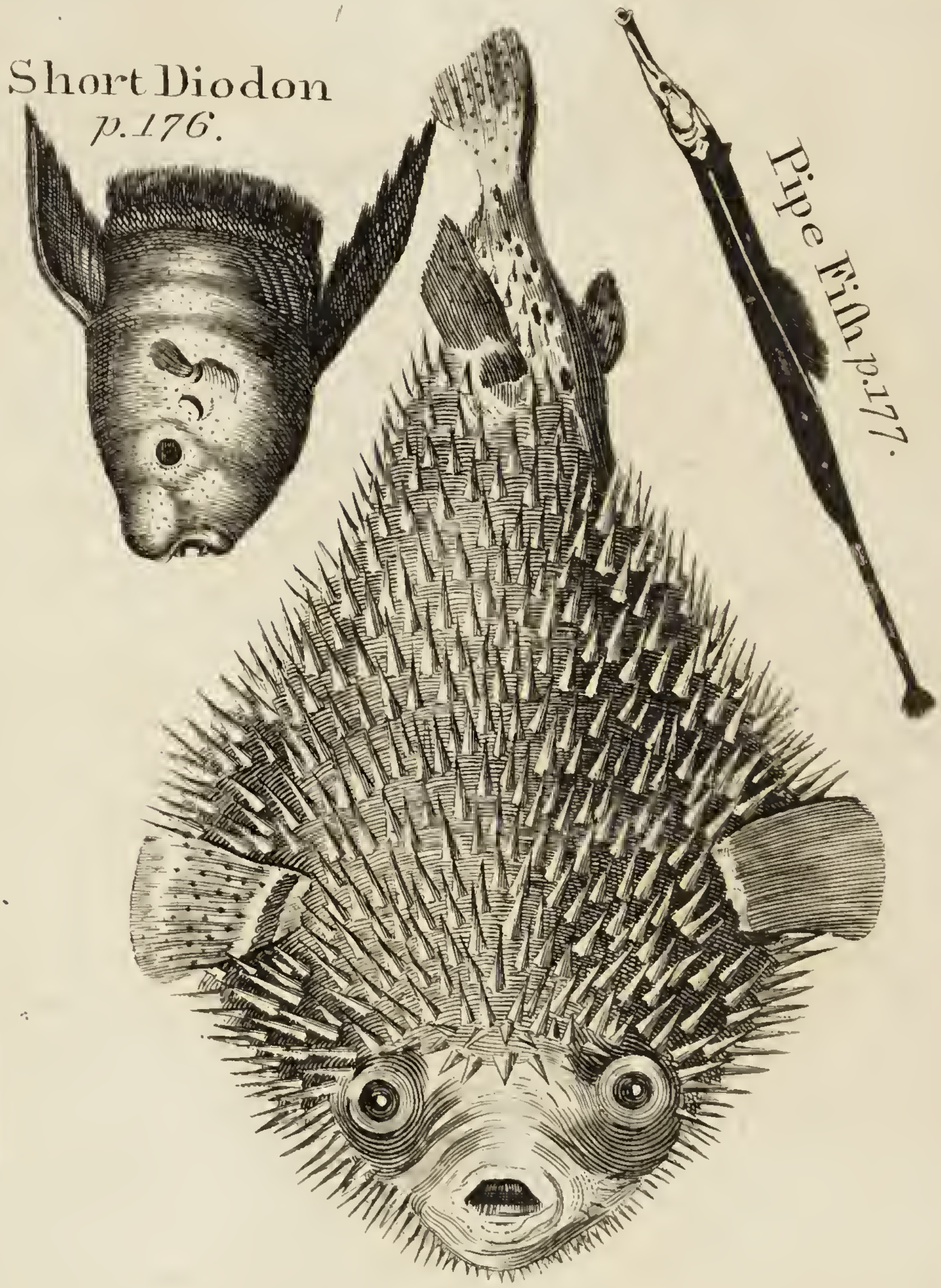
The *ſhort Diodon* (See pl. LXXXIV.) differs from the preceding, in being much ſhorter and deeper, reſembling the head of a fiſh rather than a perfect animal; both kinds are found on the weſtern coaſts of Britain, but in greater plenty in the warmer climates of Europe.

The *Globe Diodon* (See pl. LXXXII.) is common to Europe and Carolina, but is more plentiful at the latter place. The form of the body is uſually oblong, but when alarmed it has a power of inflating its belly to a globular ſhape of an immenſe ſize. This ſeems deſigned as a defence againſt fiſh of prey, which are further terrified by the innumerable ſpines with which that part is defended, and which may be erected at pleaſure. One taken at Penzance in Cornwall, was one foot ſeven inches in length.

THE LUMP-SUCKER (See pl. LXXXII.) is trifling in ſize, compared to the preceding: its length is but ſixteen inches, and its weight about ſour pounds; the ſhape of the body is like that of a bream, deep, and it ſwims edgeways; the back is ſharp and elevated, and the belly flat; the lips, mouth, and tongue of this animal are of a deep red; the whole ſkin is rough, with bony knobs, the largeſt row is along the ridge of the back; the belly is of a bright crimſon colour; but what makes the chief ſingularity in this fiſh, is, an oval aperture in the belly, ſurrounded with a fleſhy, ſoft ſubſtance, that ſeems bearded all round; by means of this part it adheres with vaſt force to any thing it pleaſes. If flung into a pail of water, it will ſtick ſo cloſe to the bottom, that on taking the fiſh by the tail, one may lift up pail and all, though it hold ſeveral gallons of water. Great numbers of theſe fiſh are found along the coaſts of Greenland in the beginning of ſummer, where they reſort to ſpawn. Their roe is remarkably large, and the Greenlanders boil it to a pulp for eating. They are extremely fat, but not admired in England, being both flabby and inſipid.

Plate 82.

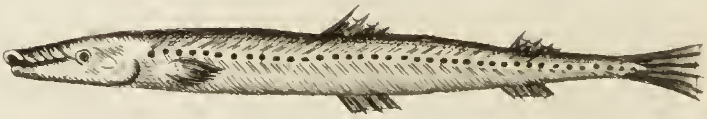

Lamprey *p.171.*
Globe Diodon *p.176.*
Lump Sucker *p.176.*
Unctuous Sucker *p.177.*



Short Diodon p. 176.

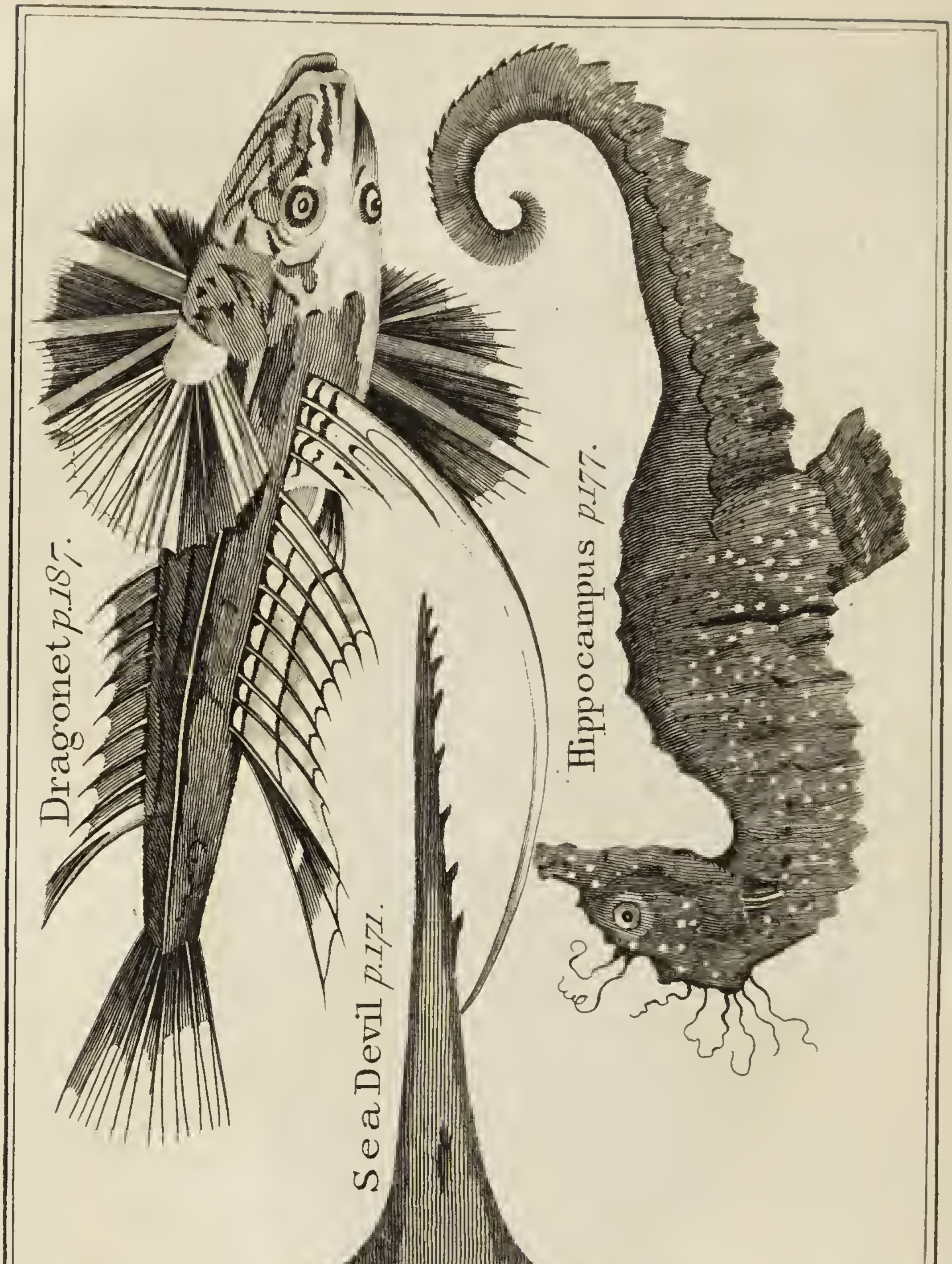
Pipe Fish p. 177.

The Sea Porcupine p. 177.



Sand Eel p. 187.

Plate.83.


Dragonet p.187.
Sea Devil p.171.
Hippocampus p.177.

The *Unctuous Sucker*, or *Sea Snail* (See pl. LXXXII.) takes its name from the ſoft and unctuous texture of its body, reſembling the ſnail upon land. It is almoſt tranſparent, and ſoon diſſolves, and melts away. It is but a little animal, being not above five inches long. The colour, when freſh taken, is of a pale brown, and the ſhape of the body is round. It is taken in England, at the mouths of rivers, four or five miles diſtant from the ſea.

The body of the PIPE FISH (See pl. LXXXIV.) in the thickeſt part, is not thicker than a ſwan-quill, while it is above ſixteen inches long. Its general colour is an olive brown, marked with numbers of bluiſh lines, pointing from the back to the belly. It is viviparous; for, on cruſhing one that was juſt taken, hundreds of very minute young ones were obſerved to crawl about.

THE HIPPOCAMPUS (See pl. LXXXIII.) which, from the form of its head, ſome call the Sea Horſe, never exceeds nine inches in length. It is about as thick as a man's thumb, and the body is ſaid, while alive, to have hair on the fore part, which falls off when it is dead. The ſnout is a ſort of tube, with a hole at the bottom, to which there is a cover, which the animal can open and ſhut at pleaſure. Behind the eyes there are two fins, which look like ears; and above them are two holes, which ſerve for reſpiration. It, upon the whole, more reſembles a great caterpillar than a fiſh.

THE SEA PORCUPINE (See pl. LXXXIV.) is almoſt round, has a mouth like a frog, and is from ſeven inches to two feet long. Like the porcupine, whence it takes its name, it is covered over with long thorns or prickles, which point on every ſide; and, when the animal is enraged, it can blow up its body as round as a bladder. Of this extraordinary creature there are many ſpecies: ſome threatening only with ſpines, and others defended with a bony helmet that covers the head.

Theſe frightful animals are of different ſizes; ſome not bigger than a foot-ball, and others as large as a buſhel. The Americans often amuſe themſelves with the barren pleaſure catching theſe frightful creatures by a line and hook baited with a piece of ſea-crab. The animal approaches the bait with its ſpines flattened; but when hooked and ſtopped by the line, ſtraight all its ſpines are erected ; the whol body being armed in ſuch a manner at all points, that it i impoſſible to lay hold of it on any part. For this reaſon it is dragged to ſome diſtance from the water, and there it quickly expires. In the middle of the belly of all theſe there is a ſort of bag or bladder filled with air, by the inflation of which the animal ſwells itſelf in the manner already mentioned.

To theſe animals may be added the GALLEY FISH, which Linnæus degrades into the inſect tribe, under the title of the Meduſa. To the eye of an unmindful ſpectator, this fiſh ſeems a tranſparent bubble, ſwimming on the ſurface of the ſea, or like a bladder variouſly and beautifully painted with vivid colours, where red and violet predominate, as variouſly oppoſed to the beams of the ſun. It is, however, an actual fiſh; the body of which is compoſed of cartilages, and a very thin ſkin filled with air, which thus keeps the animal floating on the ſurface, as the waves and the winds happen to drive. Perſons who happen to be walking along the ſhore often tread upon theſe animals ; and the burſting of their body yields a report as when one treads upon the ſwim of a fiſh. It has eight broad feet with which it ſwims, or which it expands to catch the air as with a ſail. It faſtens itſelf to whatever it meets by means of its legs, which have an adheſive quality. But what is moſt remarkable in this extraordinary creature, is the violent pungency of the ſlimy ſubſtance, with which its legs are ſmeared. If the ſmalleſt quantity but touch the ſkin, ſo cauſtic is its quality, that it burns it like hot oil dropped on the part affected. The pain is worſt in the heat of the day, but ceaſes in the cool of the evening.

CHAP.

CHAP. XXXI.

Of Bony Fiſhes in general—Apodal Fiſhes—The EEL*—The Conger—The Electrical Eel—The* WOLF-FISH*—The Launce—The* SWORD-FISH*—Jugular Fiſhes—The* DRAGONET*—The* WEEVER*—The* COD*—Three and five bearded Cods—The Haddock—The Whiting Pout—The Bib—The Poor—The Coal Fiſh—The Pollack—The Whiting—The Hake—The Ling—The Burbot—The* BLENNY*—The creſted and viviparous Blenny—Thoracic Fiſhes—The* GOBY, *or Rock Fiſh—The Remora, or Sucking Fiſh—The* BULL-HEAD*—The Miller's Thumb—The Pogge—The* DOREE*—The Opah—The* FLOUNDER*—The Hollibut—The Plaiſe—The Dab—The Sole—The Lantern Fiſh—The Turbot—The Pearl—The Whiff—The* GILT-HEAD*—The Dorado—The* WRASSE*—The Ballan, &c.—The* PERCH*—The Baſſe—The Ruffe—The* STICKLE-BACK*—The* MACKRELL*—The Tunny—The Scad—The* SURMULLET*—The* GURNARD*—Abdominal Fiſhes—The* LOACH*—The* SALMON*—The Sea Trout—The White Trout—The Samlet—The Trout—The Gillaroo, or Gizzard Trout—The Char—The Grayling—The Smelt—The Gwiniad—The* PIKE*—The Sea Needle—The Saury—The* ARGENTINE*—The* ATHERINE*—The* MULLET*—The* FLYING FISH*—The* HERRING*—The Pilchard—Herring Fiſhery—The Sprat—The Anchovy—The Shad—The* CARP*—The Barbel—The Tench—The Gudgeon—The Bream—The Rud—The Crucian—The Roach—The Dace—The Chub—The* BLEAK*—The White Bait—The* MINNOW*—The Gold and Silver Fiſh—The Art of Angling—Baits, &c. for Fiſhes—Praiſe of Angling.*

Bony Fiſhes.

THE third general Diviſion of fiſhes is into that of the Spinous, or bony kind. Theſe are obviouſly diſtinguiſhed from the reſt, by having a complete bony covering to their gills; by their being furniſhed with no other method of breathing but gills only; by their bones, which are ſharp and thorny; and their tails, which are placed in a ſituation perpendicular to the body.

The hiſtory of any one of this order very much reſembles that of all the reſt. They breathe air and water through the gills; they live by rapine, each devouring ſuch animals as its mouth is capable of admitting; and they propagate, not by bringing forth their young alive, as in the cetaceous tribes, nor by diſtinct eggs, as in the generality of the cartilaginous tribes, but by ſpawn, or peaſe, as they are generally called, which they produce by hundreds of thouſands.

The bones of this order of fiſhes, when examined but ſlightly, appear to be entirely ſolid; yet, when viewed more cloſely, every bone will be found hollow, and filled with a ſubſtance leſs rancid and oily than marrow. Theſe bones are very numerous, and pointed; and, as in quadrupeds, are the props or ſtays to which the muſcles are fixed, which move the different parts of the body.

The number of bones in all ſpinous fiſhes of the ſame kind, is always the ſame. It is a vulgar way of ſpeaking, to ſay, that fiſhes are, at ſome ſeaſons, more bony than at others; but this ſcarce requires contradiction. It is true, indeed, that fiſh are at ſome ſeaſons much fatter than at others; ſo that the quantity of the fleſh being diminiſhed, and that of the bones remaining the ſame, they appear to encreaſe in number, as they actually bear a greater proportion.

As the ſpinous fiſh partake leſs of the quadruped in their formation than any others, ſo they can bear to live out of their own element a ſhorter time. Some, indeed, are more vivacious in air than others; the eel will live ſeveral hours out of water; and the carp has been known to be fattened in a damp cellar. The method is, by placing it in a net well wrapped up in wet moſs, the mouth only out, and then hung up in a vault. The fiſh is fed with white bread and milk, and the net now and then plunged into the water.

It is impoſſible to account for the different operations of the ſame element upon animals, that, to appearance, have the ſame conformation. To ſome fiſhes, bred in the ſea, freſh water is immediate deſtruction; on the other hand, ſome fiſhes, that live in our lakes and ponds, cannot bear the ſalt water. This circumſtance may poſſibly ariſe from the ſuperior weight of the ſea water. As, from the great quantity of ſalt diſſolved in its compoſition, it is much heavier than freſh water, ſo it is probable it lies with greater force upon the organs of reſpiration, and gives them their proper and neceſſary play: on the other hand, thoſe fiſh which are uſed only to freſh water, cannot bear the weight of the ſaline fluid, and expire in a manner ſuffocated in the groſſneſs of the ſtrange element. There are ſome tribes, however, that ſpend a part of their ſeaſon in one, and a part in the other. Thus the *ſalmon*, the *ſhad*, the *ſmelt*, and the *flounder*, annually quit the ocean, and come up our rivers to depoſit their ſpawn. This ſeems the moſt important buſineſs of their lives; and there is no danger which they will not encounter, even to the ſurmounting precipices, to find a proper place for the depoſition of their future offspring. The ſalmon, upon theſe occaſions, is ſeen to aſcend rivers five hundred miles from the ſea, and to brave, not only the dangers of various enemies, but alſo to ſpring up cataracts as high as a houſe. As ſoon as they come to the bottom of the torrent, they ſeem diſappointed to meet the obſtruction, and ſwim ſome paces back; they then take a view of the danger that lies before them, ſurvey it motionleſs for ſome minutes, advance, and again retreat; till at laſt, ſummoning up all their force, they take a leap from the bottom, their body ſtraight, and ſtrongly in motion; and thus moſt frequently clear every obſtruction. It ſometimes happens, however, that they want ſtrength to make the leap; and then, in our fiſheries, they are taken in their deſcent.

But the length of the voyage performed by theſe fiſhes, is ſport, if compared to what is annually undertaken by ſome tribes that conſtantly reſide in the ocean. Of this kind are the cod, the haddock, the whiting, the mackarel, the tunny, the herring, and the pilchard.

The power of increaſing in theſe animals, exceeds our idea, as it would, in a very ſhort time, outſtrip all calculation: and a ſingle herring, if ſuffered to multiply unmoleſted, and undiminiſhed for twenty years, would ſhew a progeny greater in bulk than ten ſuch globes as that we live upon. Although the uſual way with ſpinous fiſhes is to produce by ſpawn, yet there are ſome, ſuch as the eel and the blenny, that are known to bring forth their young alive.

With reſpect to the growth of fiſhes, it is obſerved, that among carps particularly, the firſt year they grow to about the ſize of the leaf of a willow-tree; at two years, they are about four inches long. They grow but one inch more the third ſeaſon, which is five inches. Thoſe of four years old are about ſix inches; and ſeven after the fifth. From that to eight years old they are found to be large in proportion to the goodneſs of the pond, from eight to twelve inches. With regard to ſea-fiſh, the fiſhermen aſſure us, that a fiſh muſt be ſix years old before it is fit to be ſerved up to table. They inſtance it in the growth of a mackarel. They aſſure us that thoſe of a year old are as large as one's finger; that thoſe of two years, are about twice that length; at three and four years, they are that ſmall kind of mackarel that have neither milts nor rows; and between five and ſix, they are thoſe full grown fiſh that are ſerved up to our tables. In the ſame manner, with regard to flat fiſhes, they tell us that the turbot and plaiſe at one year are about the ſize of a crown piece; the ſecond year as large as the palm of one's hand; and, at the fifth and ſixth year, they are large enough to be ſerved up to table. Thus it appears, that fiſh are a conſiderable time in coming to their full growth, and that they are a long time the prey of others before it comes to their turn to be deſtroyers *.

The greedineſs with which ſea-fiſh devour the bait is prodigious, if compared with the manner they take it in freſh water. The lines of ſuch fiſhermen as go off to ſea, are coarſe, thick, and clumſy, compared to what are uſed by thoſe who fiſh at land. Their baits are ſeldom more than a piece of fiſh, or the fleſh of ſome quadruped, ſtuck on the hook in a bungling manner; and ſcarce any art is employed to conceal the deception. But it is otherwiſe in freſh water; the lines muſt often be drawn to an hair-like fineneſs; they muſt be tinctured of the peculiar colour of the ſtream; the bait muſt be formed with the niceſt art, and even, if poſſible, to exceed the perfection of nature: yet ſtill the fiſhes approach it with diffidence, and often ſwim round it with diſdain. The cod, on the banks of Newfoundland, the inſtant the hook, which is only baited with the guts of the animal laſt taken, is dropped into the water, darts to it at once, and the fiſhermen have but to pull up as faſt as they throw down. But it is otherwiſe with thoſe who fiſh in freſh waters, they muſt wait whole hours in fruitleſs expectation; and *the patience of a fiſherman* is proverbial among us.

As fiſh are enemies to one another, ſo each ſpecies is infeſted with worms of different kinds, peculiar to itſelf. The great fiſh abound with them; and the little ones are not entirely free. Theſe troubleſome vermin lodge themſelves either in the jaws, and the inteſtines internally, or near the fins without. When fiſh are healthy and fat, they are not much annoyed by them; but in winter, when they are lean or ſickly, they then ſuffer very much.

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* Traité des Pêches, par Monſieur Duhamel. Sect. 3. p. 100.

Nor does the reputed longevity of this claſs ſecure them from their peculiar diſorders. They are not only affected by too much cold, but there are frequently certain diſpoſitions of the element in which they reſide, unfavourable to their health and propagation. Some ponds they will not breed in, however artfully diſpoſed for ſupplying them with freſh recruits of water, as well as proviſion. In ſome ſeaſons alſo they are found to feel epidemic diſorders, and are ſeen dead by the water ſide, without any apparent cauſe.

The fact of ſome fiſhes in the warm climates being poiſonous when eaten, cannot be doubted. We have a paper in the Philoſophical Tranſactions, giving an account of the poiſonous qualities of thoſe found at New Providence, one of the Bahama iſlands. The author there aſſures us, that the greateſt part of the fiſh of that dreary coaſt, are all of a deadly nature: their ſmalleſt effects being to bring on a terrible pain in the joints, which, if terminating favourably, leaves the patient without any appetite for ſeveral days after. It is not thoſe of the moſt deformed figure, or the moſt frightful to look at, that are alone to be dreaded; all kinds, at different times, are alike dangerous; and the ſame ſpecies which has this day ſerved for nouriſhment, is the next, if tried, found to be fatal!

As this order of fiſhes is extremely numerous, various modes of claſſing them have been invented by different naturaliſts. The ſimpleſt is that of Linnæus, who ranks them in four diviſions, according to the poſition of the fins.

The 1ſt diviſion is what that celebrated naturaliſt terms APODAL. This includes the moſt imperfect of the order, viz. *thoſe which want the ventral or belly fins* (as the wolf fiſh, pl. LXXIX.) and conſiſts of the following genera.

THE EEL is the firſt genus of this diviſion, and includes ſeveral ſpecies.

The *common eel* is a very ſingular fiſh in ſeveral things that relate to its natural hiſtory, and in ſome reſpects borders on the nature of the reptile tribe.

It is known to quit its element, and, during night, to wander along the meadows, not only for change of habitation, but alſo for the ſake of prey, feeding on the ſnails it finds in its paſſage.

During winter, it beds itſelf deep in the mud, and continues in a ſtate of reſt like the ſerpent kind. It is very impatient of cold, and will eagerly take ſhelter in a whiſp of ſtraw flung into a pond in ſevere weather, which has ſometimes been practiſed as a method of taking them. Albertus goes ſo far as to ſay, that he has known eels to ſhelter in a hay-rick, yet all periſhed through exceſs of cold.

It has been obſerved, that in the river Nyne there is a variety of ſmall eel, with a leſſer head and narrower mouth than the common kind; that it is found in cluſters in the bottom of the river, and is called the bed-eel; theſe are ſometimes rouſed up by violent floods, and are never found at that time with meat in their ſtomachs. This bears ſuch an analogy with the cluſtering of blindworms in their quieſcent ſtate, that we cannot but conſider it as a further proof of a partial agreement in the nature of the two genera.

The ancients adopted a moſt wild opinion about the generation of theſe fiſh, believing them to be either created from the mud, or that the ſcrapings of their bodies, which they left on the ſtones, were animated, and became young eels. Some moderns gave into theſe opinions, and into others that were equally extravagant. They could not account for the appearance of theſe fiſh in ponds that were never ſtocked with them, and were even ſo remote as to make their being met with in ſuch places a phænomenon that they could not ſolve. But there is much reaſon to believe, that many waters are ſupplied with theſe fiſh by the aquatic fowl of prey, in the ſame manner as vegetation is ſpread by many of the land birds, either by being dropped as they carry them to feed their young, or by paſſing quick through their bodies, as is the caſe with herons; and ſuch may be the occaſion of the appearance of theſe fiſh in places where they were never ſeen before. As to their immediate generation, it has been ſufficiently proved to be effected in the ordinary courſe of nature, and that they are viviparous.

They are extremely voracious, and very deſtructive to the fry of fiſh.

No fiſh lives ſo long out of water as the eel; it is extremely tenacious of life, as its parts will move a conſiderable time after they are flayed and cut in pieces.

The eel is placed by Linnæus in the genus of *murœna*, his firſt of the apodal fiſh, or ſuch which want the ventral fins.

The eyes are placed not remote from the end of the noſe: the irides are tinged with red: the under jaw is longer than the upper; the teeth are ſmall, ſharp, and numerous; beneath each eye is a minute orifice; at the end of the noſe two others, ſmall and tubular.

This fiſh is furniſhed with a pair of pectoral fins, rounded at their ends. Another narrow fin on the back, uniting with that of the tail; and the anal fin joins it in the ſame manner beneath.

Behind the pectoral fins is the orifice to the gills, which are concealed in the ſkin.

Eels vary much in their colours, from a ſooty hue to a light olive green; and thoſe which are called ſilver eels, have their bellies white, and a remarkable clearneſs throughout.

Beſides theſe, there is another variety of this fiſh, known in the Thames by the name of grigs, and about Oxford by that of grigs or gluts. Theſe are ſcarce ever ſeen near Oxford in the winter, but appear in ſpring, and bite readily at the hook, which common eels in that neighbourhood will not. They have a larger head, a blunter noſe, thicker ſkin, and leſs fat than the common ſort; neither are they ſo much eſteemed, nor do they often exceed three or four pounds in weight

Common eels grow to a large ſize, ſometimes ſo great as to weigh fifteen or twenty pounds, but that is extremely rare. As to inſtances brought by Dale and others, of theſe fiſh increaſing to a ſuperior magnitude, we have much reaſon to ſuſpect them to have been congers, ſince the enormous fiſh they deſcribe have all been taken at the mouth of the Thames or Medway.

The eel is the moſt univerſal of fiſh, yet is ſcarce ever found in the Danube, though it is very common in the lakes and rivers of Upper Auſtria.

The Romans held this fiſh very cheap, probably from its likeneſs to a ſnake.

> "For you is kept a ſink-fed ſnake-like eel."
>
> Juvenal, Sat. v.

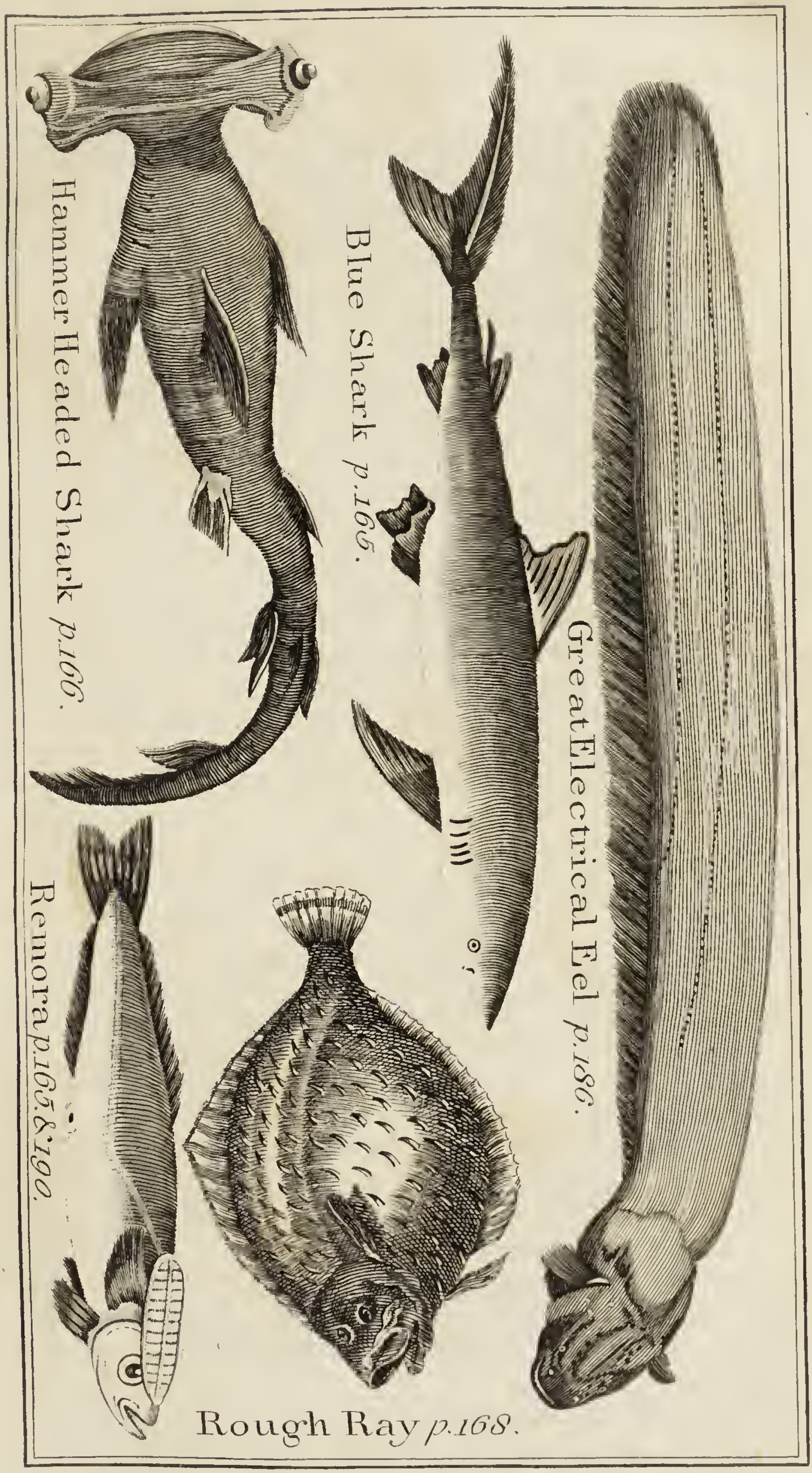
On the contrary, the luxurious Sybarites were ſo fond of theſe fiſh, as to exempt from every kind of tribute the perſons who ſold them.

The *Conger Eel* grows to an immenſe ſize: they have been taken ten feet and a half long, and eighteen inches in circumference in the thickeſt part. They differ from the common eel not only in their ſize, but in being of a darker colour, and in the form of the lower jaw, which is ſhorter than the upper. They are extremely voracious, and prey upon other fiſh, particularly upon crabs, when they have caſt their ſhell. The fiſhermen are very fearful of the large congers, leſt they ſhould endanger their legs by clinging round them; they therefore kill them as ſoon as poſſible, by ſtriking them on the navel. On the coaſt of Cornwall theſe fiſh conſtitute a conſiderable article of commerce, where they are ſalted and dried, and afterwards ground to powder, which is purchaſed by the Spaniards for the purpoſe of thickening their ſoups.

But the moſt extraordinary fiſh of this kind is the *electrical eel* (See pl. LXXX.) It is a freſh-water fiſh, found in the river of Surinam. It is ſaid ſometimes to grow to the length of twenty feet; but its uſual ſize is from three to four, and about ten or fourteen inches in circumference about the thickeſt part of the body. The head is large and flat, and perforated with ſmall holes. The jaws are without teeth. The back and ſides are covered with many light-coloured ſpots. The pectoral fins are round and ſmall, and only ſerve to raiſe the fiſh's head out of the water to breathe, which he is obliged to do every four or five minutes. The ſkin of the body is formed into a number of wrinkles, or annular bands, which give it a worm-like appearance. The electrical ſhock is conveyed either through the hand, or any metallic conductor which touches the fiſh; and a ſtroke of one of the largeſt kind proves inſtant death to even the human ſpecies. This extraordinary power is given to this fiſh, not only for defence, but ſubſiſtence. For whenever ſmall fiſhes or worms are thrown into the water, they are firſt ſtruck dead by the electric power of the animal, and afterwards ſwallowed by him.

The Wolf Fish (See pl. LXXIX.) has the body roundiſh and ſlender; the head large and blunt; the fore-teeth, above and below, conical; the grinding teeth, and thoſe in the palate, round; the fin covering the gills has ſix rays.

Plate. 80.


Hammer Headed Shark p.166.
Blue Shark p.165.
Great Electrical Eel p.186.
Remora p.165 & 190.
Rough Ray p.168.

This animal ſeems to be confined to the northern ſeas, and ſometimes is found near the coaſts of Scotland. It grows to a very large ſize, being frequently taken of the length of ſeven feet, and even more. It is a moſt ravenous and fierce fiſh, and when taken, faſtens upon every thing within its reach. It is ſaid even to bite ſo hard, that it will ſeize upon an anchor, and leave the marks of its teeth on it. It feeds almoſt entirely on ſhell-fiſh, the hardeſt of which it eaſily cruſhes with its jaws. It has ſo formidable and diſagreeable an appearance, that it is only eaten by the fiſhermen, who however prefer it to hollibut.

The Launce, or Sand Eel, (See pl. LXXXIV.) is known by a body ſlender and roundiſh; the head terminated by a beak; the teeth of a hair-like fineneſs: the fin covering the gills with ſeven rays. It grows to the length of nine or ten inches, and is found in moſt of our ſandy ſhores during the ſummer months. It conceals itſelf among the ſand, whence, during flood tide, they are rooted up, and devoured by the porpeſſes; and on the receſs of the tide they are drawn out by a hook by the fiſhermen. They are commonly made uſe of as baits for other fiſh, but they are alſo very delicate eating.

The Sword-fish (See pl. LXXVII.) is very common in the Mediterranean, and is much eſteemed as food by the Sicilians. It grows to a very large ſize, ſometimes to the weight of 100 pounds. It is of a long and rounded body, largeſt near the head, and tapering by degrees to the tail. The ſkin is rough, the back black, and the belly white. It has one fin on the back, running almoſt its whole length. It has one pair of fins alſo at the gills. But the moſt remarkable part of this fiſh is the ſnout, which, in the upper jaw, runs out in the figure of a ſword, ſometimes to the length of three feet, the under jaw is much ſhorter.

The 2d diviſion conſiſts of the Jugular Fishes, or thoſe *which have ventral fins before the pectoral*, or nearer to the gills. See the cod pl. LXXXV.

The Dragonet (See pl. LXXXIII.) is the firſt genus which naturaliſts have remarked in this diviſion. Its general characters are the upper lip doubled, the eyes very near each other, two breathing apertures on the hind part of the head, and the firſt rays of the dorſal fin extremely long. There are two ſpecies deſcribed by Mr. Pennant.

The *Gemmeous Dragonet*, which is about ten or twelve inches long, with a large head, and a body ſlender, round, and ſmooth. The colours of this fiſh are extremely beautiful, when it is juſt taken, they are yellow, blue, and white. The blue has all the ſplendour of the moſt beautiful gems. The throat is black; and the membranes of the fins are very thin and delicate. The old Engliſh writers have called this fiſh the yellow gurnard, but in reality it has no one character of that genus.

The *Sordid Dragonet* reſembles the preceding, but its firſt dorſal fin is not ſo long, nor are its colours ſo brilliant and lively.

THE WEEVER is known ſometimes to grow to the length of twelve inches, though it is commonly found much ſmaller. The lower jaw ſlopes down very abruptly, and its back is armed with ſtrong ſpines. It buries itſelf in the ſand, leaving only its noſe out, and when trod upon ſtrikes forcibly with its ſpines, which are ſaid to be venomous, though probably the pain and inflammation attending the wounds which it inflicts, depend on the habit of the perſon or the part which is ſtruck. It is good food.

THE COD (See pl. LXXXV.) is a moſt extenſive genus, including a number of well-known and uſeful fiſhes. The general characters are a ſmooth head, the fin that covers the gills conſiſting of ſeven rays, all the fins covered with a common ſkin, the ventral fins ſlender, and ending in a point. It has teeth in the jaws, and a ſeries of ſmall teeth cloſely ſet together in the palate. Moſt of the ſpecies have alſo the chin bearded.

The *common cod* is ſhort in proportion to its bulk, the belly is large and prominent, its eyes are large, and at the end of the lower jaw is a ſmall beard. It is aſh-coloured, ſpotted with yellow, and the belly white; on the back are three ſoft fins.

There are alſo the *three bearded and five bearded Cods* (See pl. LXXXVI.) both of which differ from the common ſort, not only in this character, but in having only two back fins, the latter very long.

The *Cod* ſeems to be the foremoſt of the wandering tribe of fiſhes, and is only found in our northern part of the world.

This animal's chief place of reſort is on the banks of Newfoundland, and the other ſand banks that lie off Cape Breton. That extenſive flat ſeems to be no other than the broad top of a ſea mountain, extending for above five hundred miles long, and ſurrounded with a deeper ſea. Hither the cod annually repair in numbers, beyond the power of calculation, to feed on the quantity of worms that are to be found there in the ſandy bottom. Here they are taken in ſuch quantities, that they ſupply all Europe with a conſiderable ſhare of proviſion. The Engliſh have ſtages erected all along the ſhore for ſalting and drying them; and the fiſhermen, who take them with the hook and line, which is their method, draw them in as faſt as they can throw out. This immenſe capture, however, makes but a very ſmall diminution, when compared to their numbers; and when their proviſion there is exhauſted, or the ſeaſon for propagation returns, they go off to the polar ſeas, where they depoſit their ſpawn.

The *Haddock* is a well known fiſh of this genus, which much reſembles the cod, but is ſmaller; it is alſo diſtinguiſhed by a black mark on each ſide beyond the gills, which ſuperſtition aſcribes to the impreſſion which St. Peter left with his finger and thumb, when he took the tribute out of the fiſh's mouth, which tradition would have us believe to have been of this ſpecies.

The *Whiting Pout* is another fiſh of the ſame kind, which in ſize ſeldom exceeds a foot. The back is much arched; the ſcales larger than that of the cod; and on each ſide of the jaw are ſeven or eight punctures.

The *Rib* grows alſo to the length of a foot, and the ſides are finely tinged with gold.

The *Poor* is the only ſpecies of cod found in the Mediterranean; it is not more than ſix inches long.

The *Coal Fiſh* takes its name from the black colour it ſometimes aſſumes. It grows to the length of two feet and a half, and is of a more elegant ſhape than the cod. The fleſh is little eſteemed when freſh, but is commonly ſalted and dried for ſale. The fry of this fiſh, however, is called *parr*, and is eſteemed good food.

The *Pollack* does not grow to a very large ſize, but is a very good eating fiſh. The firſt back fin has eleven rays, the middle nineteen, the laſt ſixteen. The tail is a little forked; the colour of the back is duſky, in ſome inclining to green; the belly is white.

The *Whiting* is a fiſh of an elegant form, and the moſt delicate food of all the genus. The firſt back fin has fifteen rays, the ſecond eighteen, the third twenty. The back is a pale brown, and the belly ſilvery white. It ſeldom exceeds twelve inches in length.

The ſeven laſt ſpecies have three back fins; the *hake*, (See pl. LXXXVI.) the *ling*, and the *burbot*, have only two; and the *torſk* has only one.

The BLENNY has the body oblong; the head obtuſe; the teeth a ſingle range; the fin covering the gills with ſix ſpines; the ventral fins have two ſmall blunt bones in each; it has one dorſal fin which is prickly, and ſeveral of the ſpecies are creſted, or have a ſmall fin like a creſt, upon their heads, (See pl. LXXXVI.)

The Blenny is a ſmall fiſh, meaſuring from five to ſeven inches. It is found among ſtones upon rocky coaſts, and ſometimes in the mouths of rivers. One ſpecies of this fiſh is viviparous, and brings forth two or three hundred at a time (See pl. LXXXVI.) Theſe are very common at the mouth of the Eſk, at Whitby, in Yorkſhire.

The 3d diviſion is called the THORACIC, or *thoſe fiſhes which have the belly fins immediately under the pectoral.* For this kind ſee the Ballan, plate LXXXVII.

The GOBY, OR ROCK-FISH, is not above ſix inches long. The body is ſoft, ſlippery and ſlender; the head large, the cheeks inflated. It has two back fins, and the ventral fins coaleſce, and form a ſort of funnel, by which theſe fiſh fix themſelves immoveably to the rocks.

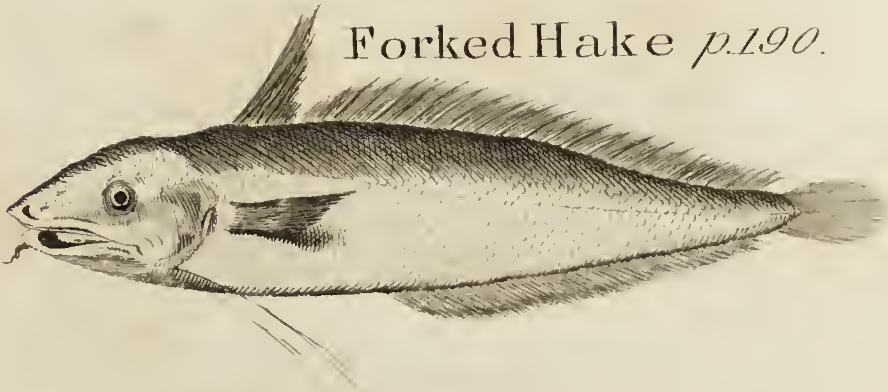
The *Remora*, or *Sucking-fiſh*, which has been already in part deſcribed, pl. LXX, appears to belong to this genus. In ſhape it reſembles a herring, but on the head has an apparatus for fixing itſelf to a ſhip, or to the body of another fiſh. It is an inhabitant of the Indian ocean.

THE BULL-HEAD is a well-known genus, including ſeveral ſpecies, all of which have a large head armed with ſpines.

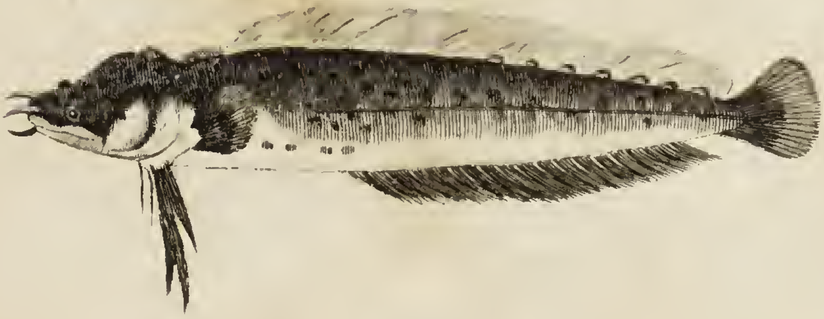
The *river bull-head*, or *miller's thumb*, is very common in all our clear lakes. It rarely exceeds three inches in length, and is eaſily diſtinguiſhed by a broad flat head, excellently adapted for inſinuating itſelf under ſtones. It is

Plate 86.

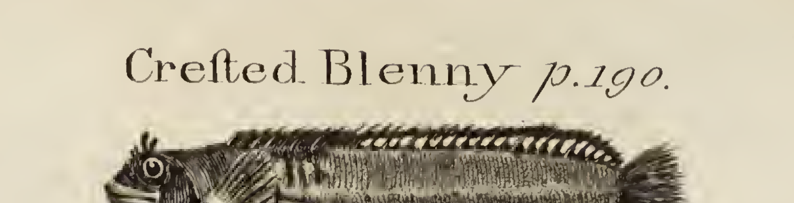
Forked Hake *p.190.*



Three Bearded Cod *p.188.*



Viviparous Blenny *p.190.*



Creſted Blenny *p.190.*

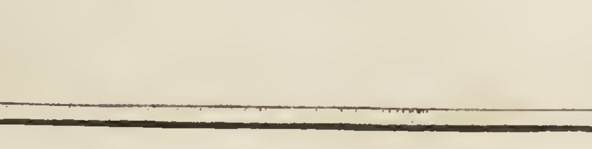
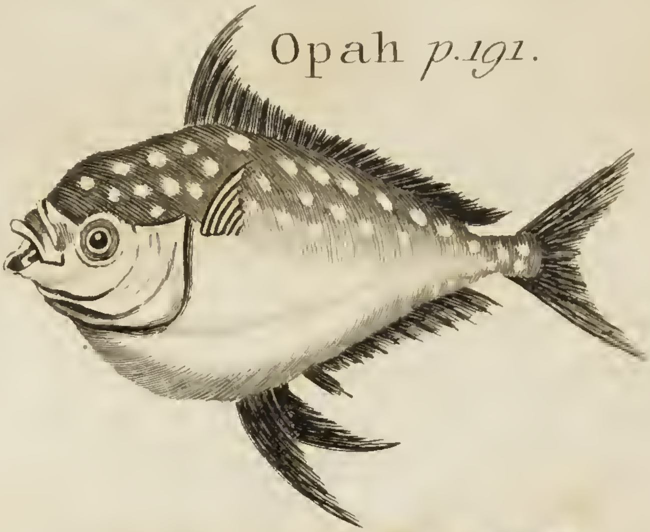
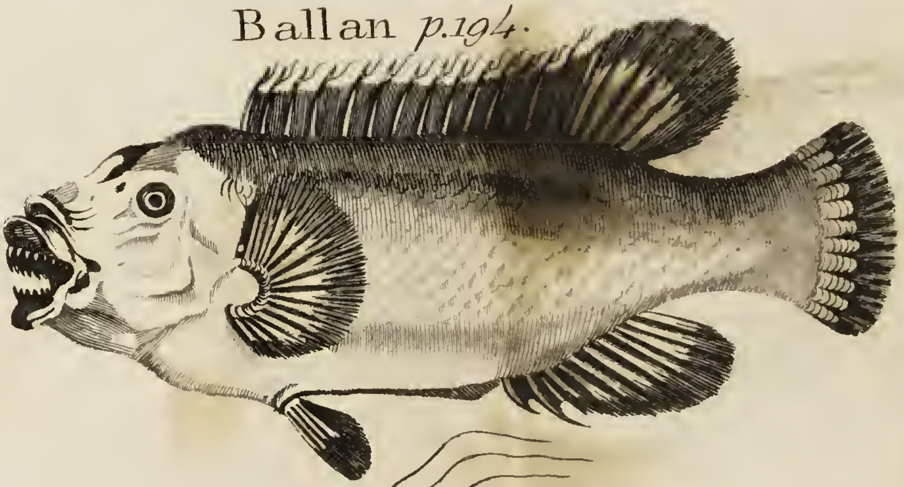


Plate.87.

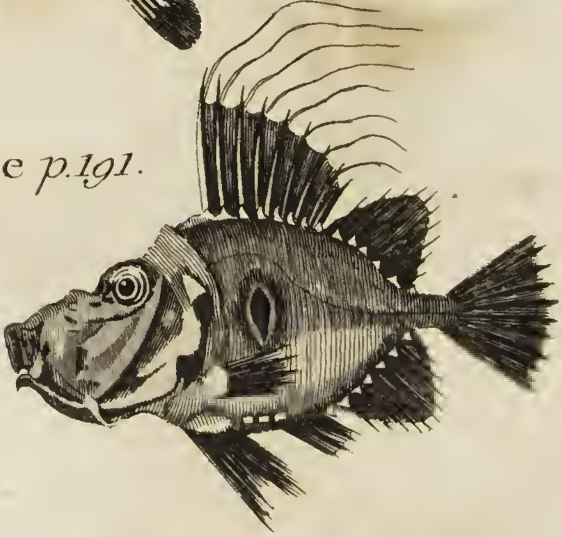
Opah *p.191.*



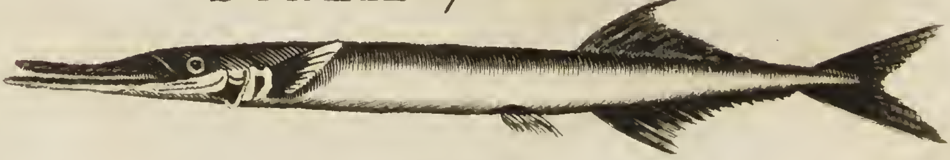
Ballan *p.194.*



Doree *p.191.*



Sea Pike *p.202.*



of a duſky colour, mixed with dirty yellow, and has two back fins.

The *Pogge*, or armed bull-head, is found on moſt of the European coaſts, and is diſtinguiſhed by its large bony head, which is armedat the noſe with four ſhort upright ſpines, and by a number of white beards at the throat. It is about five inches long.

But the moſt formidable of this genus is the *Father Laſher*, or Sea Scorpion. It is about eight or nine inches long. The noſe, the top of the head, and the back fins are armed with ſtrong ſharp ſpines. It is exceeding common in the Newfoundland ſeas, and makes a principal article of food in Greenland.

THE DOREE (See pl. LXXXVII.) is almoſt equally famous in the legends of ſuperſtition with the haddock, and is its rival in the honour of being the fiſh from which St. Peter took the tribute money, leaving on its ſides the mark of his finger and thumb. The form of this fiſh is very diſguſting. Its body is oval, and much compreſſed at the ſides. Its ſnout is long, and its mouth wide. The firſt back fin conſiſts of ten ſpiny rays, with long filaments, the ſecond of twenty-four ſoft rays. The tail is round at the end. The colour of the body is olive, varied with light blue and white; while living it has the appearance of gilding, whence its name *Doree* (gilt.)

Such was the unpleaſant form of this fiſh, that it was long before it attracted the notice of the epicure; Mr. Pennant obſerves, indeed, that to the celebrated actor, Mr. Quin, it is chiefly indebted for its reputation.

The *Opah* (See pl. LXXXVII.) is another of this genus, which ſometimes arrives at an immenſe ſize. One was caught at Torbay in 1772, which weighed 140 pounds. It was in length four feet and a half; in breadth two feet and a quarter, though the greateſt thickneſs was only four inches. The general colour was a tranſparent ſcarlet varniſh, ſpangled with ſilver ſpots of various ſizes. The mouth of this fiſh is exceedingly ſmall for its ſize.

THE FLOUNDER is a very extenſive genus, including thoſe innumerable ſpecies which are known by the common term, flat fiſh, and which are diſtinguiſhed from all others by one invariable characteriſtic, viz. that of having both the eyes on the ſame ſide of the head.

The *Hollibut* is by much the largeſt of the genus, weighing commonly from one hundred to three hundred pounds. The hollibut is the moſt voracious of fiſhes, and has been known to ſwallow even the lead which ſeamen make uſe of for the purpoſe of ſounding the depth. Its back is a duſky colour, its belly pure white. The fleſh is very coarſe and indifferent food. It is the narroweſt fiſh in proportion to its length of any of this genus, except the ſole.

The *Plaiſe* is ſometimes known to weigh fifteen pounds. It is eaſily diſtinguiſhed by the upper part of the body, which is duſky, being marked with large orange-coloured ſpots.

The *Flounder*, or *Fluke*, may be eaſily known from every other fiſh of this genus, by a row of ſharp ſmall ſpines, which ſurround its upper ſides, and are juſt placed where the fins join to the body. It frequents our rivers, where it may be termed a fiſh of paſſage, generally repairing thither at certain ſeaſons to depoſit its ſpawn. The back is of a pale brown, ſometimes marked with a few obſcure ſpots.

The *Dab* is found often along with the flounder, but is leſs common. It is ſmaller than either the plaiſe or the flounder, but is more eſteemed as food. The back is generally of a uniform brown colour, ſometimes clouded with a darker. It is in ſeaſon from February to April.

The *Sole* is a well-known fiſh, which ſometimes is found of the weight of ſix or ſeven pounds. On the northern coaſts it is much ſmaller.

The *ſmooth Sole*, or *Lantern Fiſh*, is almoſt peculiar to the coaſt of Cornwall. It is thin, white, and almoſt pellucid.

The *Turbot* is the moſt celebrated of all this genus, and has been known to grow to the weight of thirty pounds. The turbot fiſhery is of conſiderable importance to the Dutch. The mode of conducting it is the ſame with that employed for taking the ray, and has already been minutely deſcribed.

The *Pearl* reſembles the turbot, but is inferior to it as food; its back is of a deep brown, marked with ſpots of a dirty yellow.

The *Whiff* reſembles the hollibut, but is ſmaller.

THE GILT-HEAD takes its name from its predominant colour, the forehead and ſides reſembling gold, though the latter are tinged with brown. It has but one back fin, which reaches the whole length of the body. In form it in ſome degree reſembles the bream. It is found in deep waters, on bold rocky ſhores; it ſubſiſts chiefly on ſhell-fiſh, and ſome of the ſpecies grow to the weight of ten pounds.

Beſides the *lunated*, which is the moſt common, and takes its name from a ſemi-lunar gold ſpot under the eyes, there are the *red* and the *toothed gilt-heads*, the laſt of which is diſtinguiſhed by two long and ſlender canine teeth on each ſide.

There is a fiſh in ſome degree reſembling the preceding, which is called by naturaliſts, by way of eminence, the DORADO, but which the ſailors erroneouſly term the dolphin, is chiefly found in the tropical climates; and is at once the moſt active, and the moſt beautiful of the finny race. It is about ſix feet long; the back all over enamelled with ſpots of a bluiſh green and ſilver; the tail and fins of a gold colour; and all have a brilliancy of tint, that nothing but Nature's pencil can attain to: the eyes are placed on each ſide of the head, large and beautiful, ſurrounded with circles of ſhining gold. In the ſeas where they are found, theſe fiſh are always in motion, and play round ſhips in full ſail, with eaſe and ſecurity: for ever either purſuing or purſued, they are ſeen continually in a ſtate of warfare; either defending themſelves againſt the ſhark, or darting after the ſmaller fiſhes.

Above all others, the *Flying-fiſh* moſt abounds in theſe ſeas; and as it is a ſmall animal, ſeldom growing above the ſize of a herring, it is chiefly ſought by the dorado. Nature has furniſhed each reſpectively with the powers of purſuit and evaſion. The dorado being above ſix feet long, yet not thicker than a ſalmon, and furniſhed with a full complement of fins, cuts its way through the water with amazing rapidity; on the other hand, the flying fiſh is furniſhed with two pair of fins, longer than the body, and theſe alſo moved by a ſtronger ſet of muſcles than any other. This equality of power ſeems to furniſh one of the moſt entertaining ſpectacles thoſe ſeas can exhibit. The efforts to ſeize on the one ſide, and the arts of eſcaping on the other, are perfectly amuſing. The dorado is ſeen, upon this occaſion, darting after its prey, which will not leave the water, while it has the advantage of ſwimming, in the beginning of the chace. But, like an hunted hare, being tired at laſt, it then has recourſe to another expedient for ſafety, by flight. The long fins, which began to grow uſeleſs in the water, are now exerted in a different manner, and different direction to that in which they were employed in ſwimming: by this means the timid little animal riſes from the water, and flutters over its ſurface, for two or three hundred yards, till the muſcles employed in moving the wings, are enfeebled by that particular manner of exertion. By this time, however, they have acquired a freſh power of renewing their efforts in the water, and the animal is capable of proceeding with ſome velocity by ſwimming: ſtill, however, the active enemy keeps it in view, and drives it again from the deep; till, at length, the poor little creature is ſeen to dart to ſhorter diſtances, to flutter with greater effort, and to drop down at laſt into the mouth of its fierce purſuer. But not the dorado alone, all animated nature ſeems combined againſt this little fiſh, which ſeems poſſeſſed of double powers, only to be ſubject to greater dangers. For though it ſhould eſcape from its enemies of the deep, yet the tropic bird, and the albatroſs, are for ever upon the wing to ſeize it. Thus purſued in either element, it ſometimes ſeeks refuge from a new enemy; and it is not unfrequent for whole ſhoals of them to fall on ſhipboard, where they furniſh man with an object of uſeleſs curioſity.

THE WRASSE includes ſeveral ſpecies, the moſt common of which is the *Antient Wraſſe*, or *Old Wife.* It is of a clumſy ſhape, not unlike a carp, and covered with large ſcales; it has one large back fin, which conſiſts of ſixteen ſharp ſpiny rays, and nine ſoft ones. The tail conſiſts of fourteen ſoft branching rays, and is rounded at the end. They vary greatly in colour, ſome being of a dirty red, and others beautifully ſtriped. They are generally found in deep water, adjacent to the rocks, and feed upon ſhell-fiſh. They grow to the weight of four or five pounds.

Beſides theſe ſpecies, Mr. Pennant has enumerated the *Ballan* (See pl. LXXXVII.) the *bimaculated*, *trimaculated*, *ſtriped*, and *gibbous Wraſſe*, the *Goldſinny*, the *Scomber*, and the *Cook*.

THE PERCH of Ariſtotle and Auſonius is the ſame with that of the moderns. That mentioned by Oppian, Pliny, and Athenæus, is a ſea-fiſh, probably of the *Labrus* or *Sparus* kind, being enumerated by them among ſome congenerous ſpecies. Our perch was much eſteemed by the Romans.

Nor is it leſs admired at preſent, as a firm and delicate fiſh; the Dutch, indeed, are particularly fond of it when made into a diſh called water ſouchy.

It is a gregatious fiſh, and loves deep holes and gentle ſtreams. It is a moſt voracious fiſh, and eager biter; if the angler meets with a ſhoal of them, he is ſure of taking every one.

It is a common notion that the pike will not attack this fiſh, being fearful of the ſpiny fins which the perch erects on the approach of the former. This may be true in reſpect to large fiſh; but it is well known the ſmall ones are the moſt tempting bait that can be laid for the pike.

The perch is a fiſh very tenacious of life: we have known them carried near ſixty miles in dry ſtraw, and yet ſurvive the journey.

Theſe fiſh ſeldom grow to a large ſize: we once heard of one that was taken in the Serpentine river, Hyde Park, that weighed nine pounds; but that is very uncommon.

The body is deep; the ſcales very rough; the back much arched; ſide-line near the back.

The irides golden; the teeth ſmall, diſpoſed in the jaws, and on the roof of the mouth; the edges of the covers of the gills ſerrated; on the lower end of the largeſt is a ſharp ſpine.

The firſt dorſal fin conſiſts of fourteen ſtrong ſpiny rays; the ſecond of ſixteen ſoft ones; the pectoral fins are tranſparent, and conſiſt of fourteen rays; the ventral of ſix; the anal of eleven.

The tail is a little forked.

The colours are beautiful; the back, and part of the ſides being of a deep green, marked with five broad black bars pointing downwards; the belly is white, tinged with red; the ventral fins of a rich ſcarlet; the anal fins and tail of the ſame colour, but rather paler.

In a lake called Llyn Raithlyn, in Merionethſhire, is a very ſingular variety of perch; the back is quite hunched, and the lower part of the back-bone, next the tail, ſtrangely diſtorted; in colour, and in other reſpects, it reſembles the common kind, which are as numerous in the lake as theſe deformed fiſh. They are not peculiar to this water; for Linnæus takes notice of a ſimilar variety found at Fahlun, in his own country. We have alſo heard that it is to be met with in the Thames, near Marlow.

The *Baſſe* is a larger and coarſer kind of perch, which ſometimes grows to the weight of fifteen pounds. It is, however, of rather a longer make, more reſembling that of a ſalmon. The back is duſky, tinged with blue, and the belly white. The *Sea Perch* grows to about a foot long. The head is large and deformed, and covered with ſharp ſpines. The colour is red, with a black ſpot on the covers of the gills, and ſome tranſverſe duſky lines on the ſides.

The *Ruffe* is a well known fiſh. It is armed with ſpines like the perch, but has only one back fin. It is of a dirty green, almoſt tranſparent, and ſpotted with black. It is found in ſhoals in the deep parts of running ſtreams, and is eſteemed good food. It ſeldom exceeds ſix inches in length.

THE STICKLE-BACK is a well known little fiſh. In the fens of Lincolnſhire they are found in ſuch numbers, that they are uſed to manure the land. There are three ſpecies, the common, or *three ſpined*, the *ten ſpined*, and the fifteen ſpined. The two firſt ſeldom reach the length of two inches, the latter ſometimes grows to that of ſix, and is found in the ſea only.

THE MACKREL genus is diſtinguiſhed by a number of ſmall fins, between the back fin and the tail. The common mackrel is a beautiful fiſh, which is well known for the ſeaſonable viſits which it pays to our ſhores. Nothing can equal the brilliancy of its colours, which are a fine green, varied with blue and black, and which death indeed impairs, but cannot totally deſtroy.

The *Mackrel*, as well as the *Haddock* and the *Whiting*, are thought, by ſome, to be driven upon our coaſts rather by their fears than their appetites; and it is to the purſuit of the larger fiſhes, we owe their welcome viſits. It is much more probable, that they come for that food which is found in more plenty near the ſea ſhore, than farther out at ſea. The limits of a ſhoal are preciſely known; for if the fiſhermen put down their lines at the diſtance of more than three miles from the ſhore, they catch nothing but dog-fiſh: a proof that the haddock is not there.

The *Tunny* (See pl. LXXXV.) retains not only the character, but the habits of the mackrel. They reſort in vaſt ſhoals to the Mediterranean at certain ſeaſons, and, from the earlieſt periods of hiſtory, have conſtituted a conſiderable branch of commerce there. The tunny, however, differs greatly from the mackrel in ſize. One which Mr. Pennant ſaw at Inverary weighed 460 pounds. It was ſeven feet ten inches in length, and the circumference in the largeſt part was five feet ſeven, and near the tail only one foot ſix. The pieces, when freſh cut, appear like raw beef, but when boiled turn pale, and have ſomething of the flavour of ſalmon.

The *Scad*, or *horſe mackrel*, is much ſmaller than the tunny. It is diſtinguiſhed by a large black ſpot on the covers of the gills, and by the ſecond back fin reaching almoſt to the tail. It is tolerable food.

THE SURMULET has the body ſlender; the head almoſt four-cornered; the fin covering the gills with three ſpines; ſome of theſe have beards; it was a fiſh highly prized by the Romans, and is ſtill conſidered as a very great delicacy.

THE GURNARD genus is known by a ſlender body, the head nearly four-corned, and covered with a bony coat; the fin covering the gills with ſeven ſpines; the pectoral and ventral fins, ſtrengthened with additional muſcles and bones, and very large for the animal's ſize.

Of the gurnard Mr Pennant has remarked five ſpecies. The *grey*, the *red*, the *piper*, the *ſapphirine*, and the *ſtreaked*. They have all nearly the ſame nature and manners. They are taken in deep water, with no other bait than a red rag, and are eſteemed good food.

The 4th diviſion of the ſpinous fiſhes conſiſts of the ABDOMINAL, or thoſe which have the *ventral fins behind the pectoral*, that is nearer the tail, as in the ſalmon. (See pl. LXXXV.)

THE LOACH is the firſt genus which is noticed in this diviſion, and is a well-known little fiſh, which never exceeds four inches in length. It is diſtinguiſhed by an oblong body; almoſt equally broad throughout; the head ſmall, a little elongated; the eyes in the hinder part of the head; the fin covering the gills from four to ſix rays; the covers of the gills cloſed below. (See pl. LXXXVIII.)

THE SALMON (See pl. LXXXV.) is too well known to require a deſcription. It is entirely a northern fiſh, being found both at Greenland and Kamſchatka, but never ſo far ſouth as the Mediterranean. About the latter end of the year the ſalmon begin to preſs up the rivers to depoſit their ſpawn, which lies buried in the ſand till ſpring, if not diſturbed by the floods, or devoured by other fiſhes. About March the young ones begin to appear, and about the beginning of May the river is full of the ſalmon fry, which are then four or five inches long, and gradually proceed to the ſea. About the middle of June the earlieſt fry begin to return again from the ſea, and are then from twelve to fourteen inches long. The growth of this fiſh is ſo extraordinary, that a young ſalmon being taken a Warrington, and which weighed ſeven pounds on the 7th of February, being marked with a ſciſſars on the back fin, was again taken on the ſeventeenth of March following, and was then found to weigh ſeventeen pounds and a half.

The *Sea-trout*, or *Salmon-trout*, migrates like the ſalmon up ſeveral of our rivers, ſpawns, and returns to the ſea. The ſhape is thicker than the common trout. The head and back are duſky, with a gloſs of blue and green, and the ſides, as far as the lateral line, are marked with large irregular ſpots of black. The fleſh, when boiled, is red, and reſembles that of the ſalmon in taſte.

The *White Trout* appears much of the ſame nature, and migrates out of the ſea into the river Eſk, in Cumberland, from July to September.

The *Samlet* is conſidered by Mr. Pennant as a diſtinct ſpecies, and not as the fry of the ſalmon, as ſome perſons have ſuppoſed. In this caſe it muſt be conſidered as the ſmalleſt of the trout genus, from which, however, it materially differs, as may be ſeen by inſpecting plate LXXXVIII. It ſeldom exceeds ſix or ſeven inches in length.

The *Trout.* (See pl. LXXXVIII.) It is a matter of ſurpriſe that this common fiſh has eſcaped the notice of all the ancients, except Auſonius: It is alſo ſingular, that ſo delicate a ſpecies ſhould be neglected, at a time when the folly of the table was at its height; and that the epicures ſhould overlook a fiſh that is found in ſuch quantities in the lakes of their neighbourhood, when they ranſacked the univerſe for dainties. The milts of *murænæ* were brought from one place; the livers of *ſcari* from another; and oyſters even from ſo remote a ſpot as our Sandwich: but there was, and is a faſhion in the article of good living. The Romans ſeem to have deſpiſed the trout, the piper, and the doree;

dorée; and we believe Mr. Quin himſelf would have reſigned the rich paps of a pregnant ſow, the heels of camels, and the tongues of *flamingos*, though dreſſed by Heliogabalus's cooks, for a good jowl of ſalmon with lobſter ſauce.

The colours of the trout, and its ſpots, vary greatly in different waters, and in different ſeaſons; yet each may be reduced to one ſpecies. In Llyndivi, a lake in South Wales, are trouts called *coch-y-dail*; marked with red and black ſpots as big as ſix-pences; others unſpotted, and of a reddiſh hue, that ſometimes weigh near ten pounds, but are bad taſted.

In Lough Neagh, in Ireland, are trouts called there *buddaghs*, which ſometimes weigh thirty pounds.

Trouts (probably of the ſame ſpecies) are alſo taken in Ulles-water, a lake in Cumberland, of a much ſuperior ſize to thoſe of Lough Neagh. Theſe are ſuppoſed to be the ſame with the trout of the lake of Geneva.

In the river Eyneon, not far from Machyntleth, in Merionethſhire, and in one of the Snowdon lakes, are found a variety of trout, which are naturally deformed, having a ſtrange crookedneſs near the tail, reſembling that of the perch before deſcribed.

The ſtomachs of the common trouts are uncommonly thick and muſcular. They feed on the ſhell-fiſh of lakes and rivers, as well as on ſmall fiſh. They likewiſe take into their ſtomachs gravel, or ſmall ſtones, to aſſiſt in comminuting the teſtaceous parts of their food. The trouts of certain lakes in Ireland, ſuch as thoſe of the province of Galway, and ſome others, are remarkable for the great thickneſs of their ſtomachs, which, from ſome ſlight reſemblance to the organ of digeſtion in birds, have been called gizzards; the Iriſh name the ſpecies that has them, *Gillaroo* trouts. Theſe ſtomachs are ſometimes ſerved up to table, under the former appellation. It does not, however, appear, that the extraordinary ſtrength of ſtomach in the Iriſh fiſh ſhould give any ſuſpicion that it is a diſtinct ſpecies; the nature of the waters might encreaſe the thickneſs; or the ſuperior quantity of ſhell-fiſh, which may more frequently call for the uſe of its comminuting powers than thoſe of our trouts, might occaſion this difference.

Trouts are moſt voracious fiſh, and afford excellent diverſion to the angler; the paſſion for the ſport of angling is ſo great in the neighbourhood of London, that the liberty of fiſhing in ſome of the ſtreams in the adjacent counties, is purchaſed at the rate of ten ponnds per annum.

Theſe fiſh ſhift their quarters to ſpawn, and, like ſalmon, make up towards the heads of rivers to depoſit their roes.

The *Charr* (See pl. LXXXVIII.) is found in the lakes of the north, and in thoſe of the mountainous parts of Europe. The inhabitants of Weſtmoreland diſtinguiſh them into different kinds, according to their colours, but they appear to be rather varieties than different ſpecies. Theſe fiſh ſeldom exceed twelve inches in length. The head, back, dorſal fin, and tail, are duſky blue, and the ſides are marked with a number of bright red ſpots. They are eſteemed as a very delicate food.

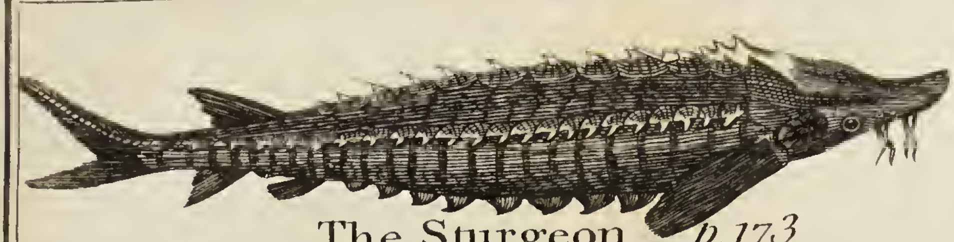
The *Grayling* is another of this genus, which haunts clear and rapid ſtreams. It is of an elegant form, leſs deep than a trout. It is in general of a fine ſilvery grey, but when juſt taken it is varied ſlightly with blue and gold. The ſcales are large; the firſt dorſal fin conſiſts of twenty-one rays; this fin is ſpotted, all the reſt are plain; the tail is much forked. The largeſt that as been heard of was taken near Ludlow; it was half a yard long, and weighed four pounds ſix ounces.

The *Smelt* inhabits the northern ſeas, and is never found ſo far ſouth as the Mediterranean. Its name is ſuppoſed to be a contraction of "ſmell it," from its very agreeable ſmell. Its form is very elegant, and the ſkin is almoſt tranſparent. The largeſt we have heard of was thirteen inches long, and weighed half a pound.

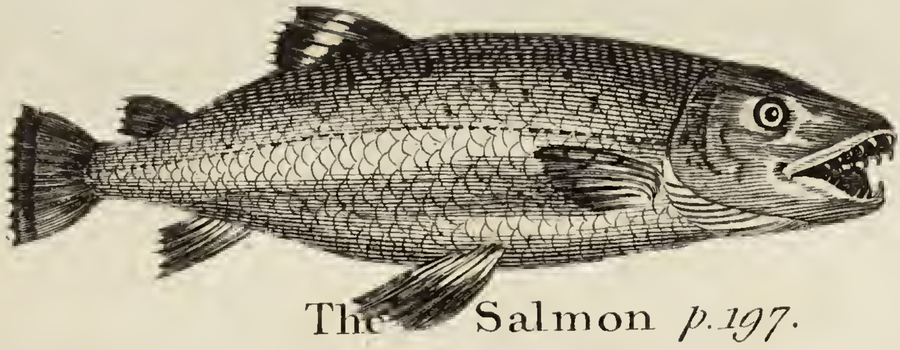
The *Gwiniad* is found in the lakes of ſeveral of the alpine parts of Europe. It is a gregarious fiſh, and approaches the ſhores in vaſt ſhoals in ſpring and ſummer. A Hulſe-water fiſherman, in 1775, took near eight thouſand at one draught. It is of an inſipid taſte, and muſt be eaten ſoon. The back is arched and gloſſed with blue and purple, the ſides are of a ſilvery caſt, tinged with gold. The mouth is ſmall, and without teeth. It is about eleven inches long.

THE PIKE (See pl. LXXXV.) is common in moſt of the lakes of Europe, but the largeſt are thoſe taken in Lapland, which, according to Schæffer, are ſometimes eight feet long. They are taken there in great abundance, dried, and exported for ſale. The largeſt fiſh of this kind which

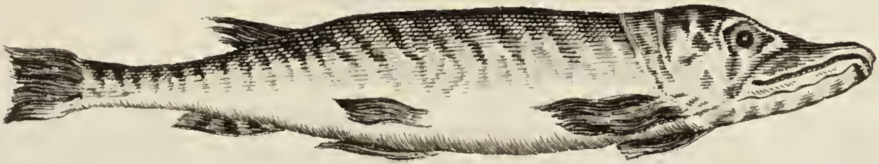
Plate. 85.



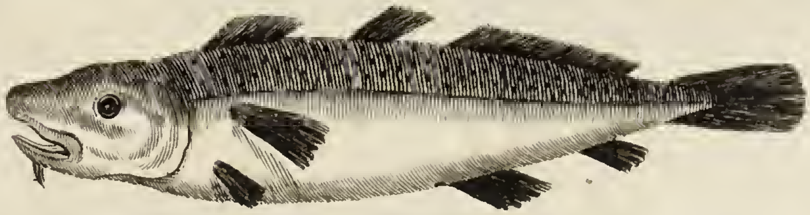
The Sturgeon *p. 173.*



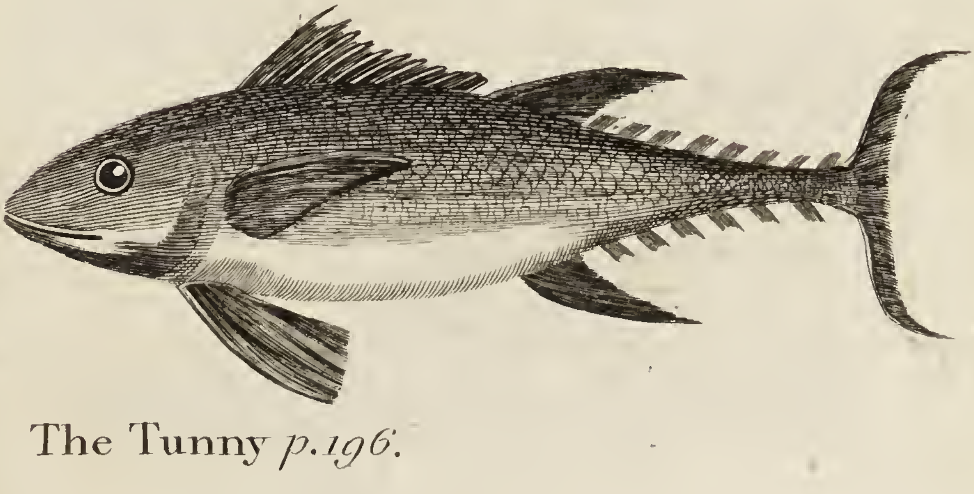
The Salmon *p. 197.*



The Pike *p. 200.*



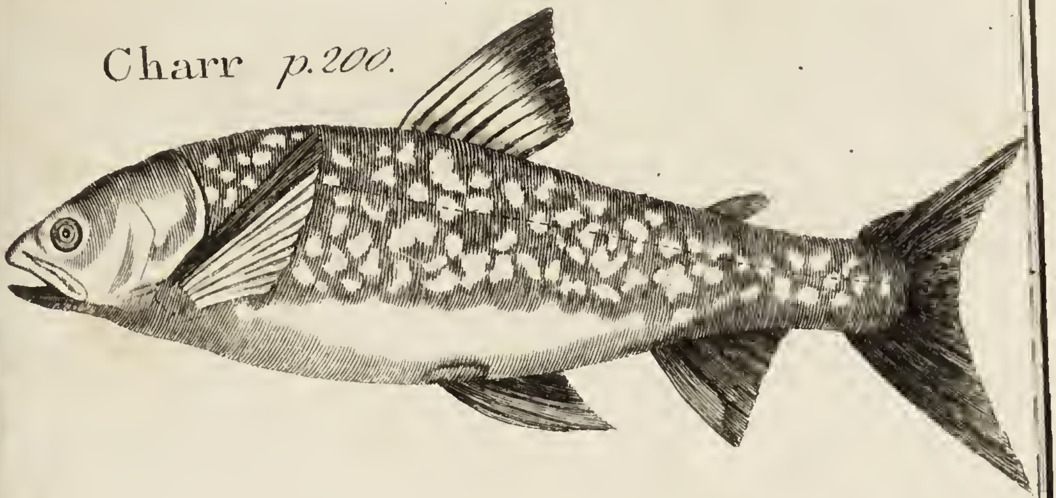
The Cod *p. 188.*



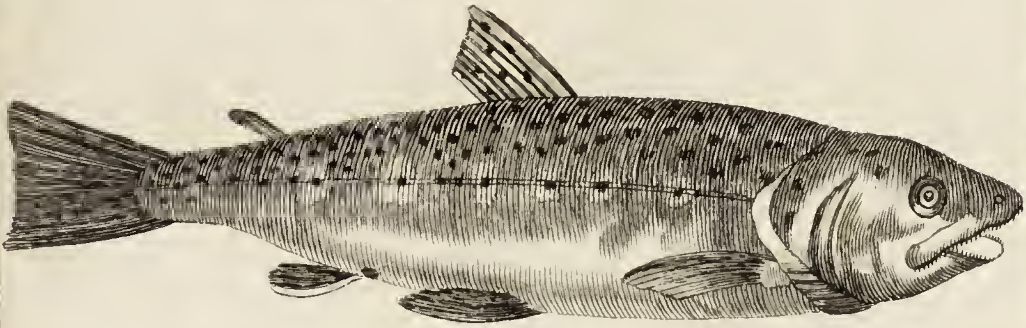
The Tunny *p. 196.*

Plate.88.

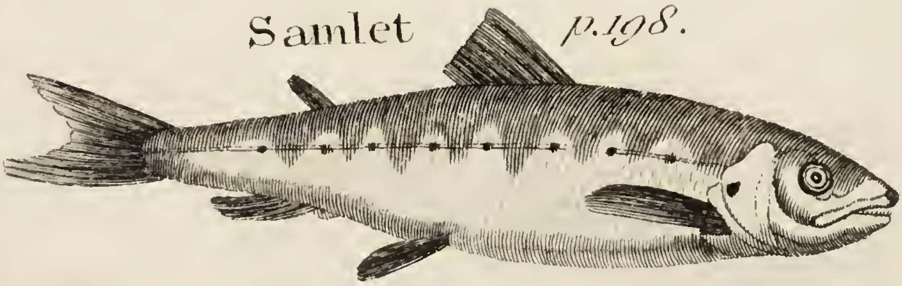
Charr *p.200.*



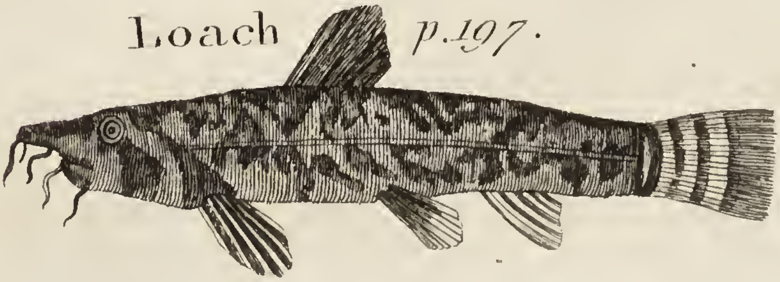
Trout *p.188.*



Samlet *p.198.*



Loach *p.197.*



which we ever heard of in England, weighed thirty-five pounds.

According to the common ſaying, theſe fiſh were introduced into England in the reign of Henry VIII. in 1537. They were ſo rare, that a pike was ſold for double the price of a houſe-lamb, in February, and a pickerel for more than a fat capon.

All writers who treat of this ſpecies bring inſtances of its vaſt voraciouſneſs. We have known one that was choaked by attempting to ſwallow one of its own ſpecies that proved too large a morſel. Yet its jaws are very looſely connected; and have on each ſide an additional bone like the jaw of a viper; which renders them capable of greater diſtenſion when it ſwallows its prey. It does not confine itſelf to feed on fiſh and frogs, it will devour the water-rat, and draw down the young ducks as they are ſwimming about.

At the Marquiſs of Stafford's canal at Trentham, a pike ſeized the head of a ſwan, as ſhe was feeding under water, and gorged ſo much of it as killed them both. The ſervants perceiving the ſwan with its head under water for a longer time than uſual, took the boat, and found both ſwan and pike dead.

But there are inſtances of its fierceneſs ſtill more ſurpriſing, and which, indeed, border a little on the marvellous. Geſner relates, that a famiſhed pike in the Rhone, ſeized on the lips of a mule, that was brought to water, and that the beaſt drew the fiſh out before it could diſengage itſelf; that people have been bit by theſe voracious creatures while they were waſhing their legs, and that they will even contend with the otter for its prey, and endeavour to force it out of its mouth.

Small fiſh ſhew the ſame uneaſineſs and deteſtation at the preſence of this tyrant, as the little birds do at the ſight of the hawk or owl. When the pike lies dormant near the ſurface (as is frequently the caſe) the leſſer fiſh are often obſerved to ſwim around it in vaſt numbers, and in great anxiety. Pike are often haltered in a nooſe, and taken while they lie thus aſleep, as they are often found in the ditches near the Thames, in the month of May.

In the ſhallow water of the Lincolnſhire fens, they are frequently taken in a manner peculiar, we believe, to that country, and the iſle of Ceylon. The fiſhermen make uſe of what is called a crown-net, which is no more than a hemiſpherical baſket, open at top and bottom. He ſtands at the end of one of the little fen-boats, and frequently puts his baſket down to the bottom of the water, then poking a ſtick into it, diſcovers whether he has any booty by the ſtriking of the fiſh; and vaſt numbers of pike are taken in this manner.

The longevity of this fiſh is very remarkable, if we may credit the accounts given of it. Rzaczynſki tells us of one that was ninety years old; but Geſner relates, that in the year 1497, a pike was taken near Hailbrun, in Suabia, with a brazen ring affixed to it, on which were theſe words in Greek characters: *I am the fiſh which was firſt of all put into this lake by the hands of the governor of the univerſe,* Frederick *the ſecond, the 5th of October,* 1230: ſo that the former muſt have been an infant to this Methuſalem of a fiſh.

Pikes ſpawn in March or April, according to the coldneſs or warmth of the weather. When they are in high ſeaſon, their colours are very fine, being green, ſpotted with bright yellow; and the gills are of a moſt vivid and full red. When out of ſeaſon, the green changes to grey, and the yellow ſpots turn pale.

The head is very flat; the upper jaw broad, and is ſhorter than the lower: the under jaw turns up a little at the end, and is marked with minute punctures.

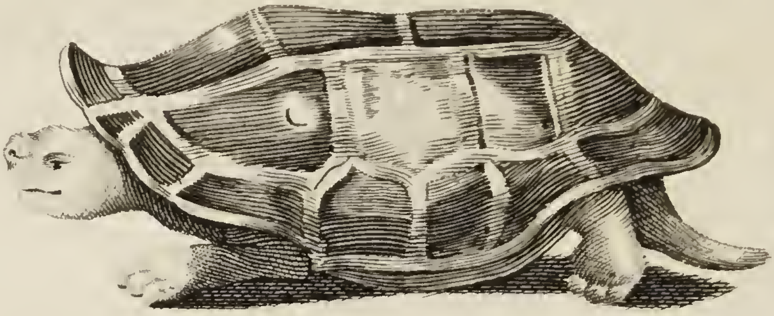
The teeth are very ſharp, diſpoſed only in the front of the upper jaw, but in both ſides of the lower, in the roof of the mouth, and often the tongue. The ſlit of the mouth, or the gape, is very wide; the eyes ſmall.

The dorſal fin is placed very low on the back, and conſiſts of twenty-one rays; the pectoral of fifteen; the ventral of eleven; the anal of eighteen.

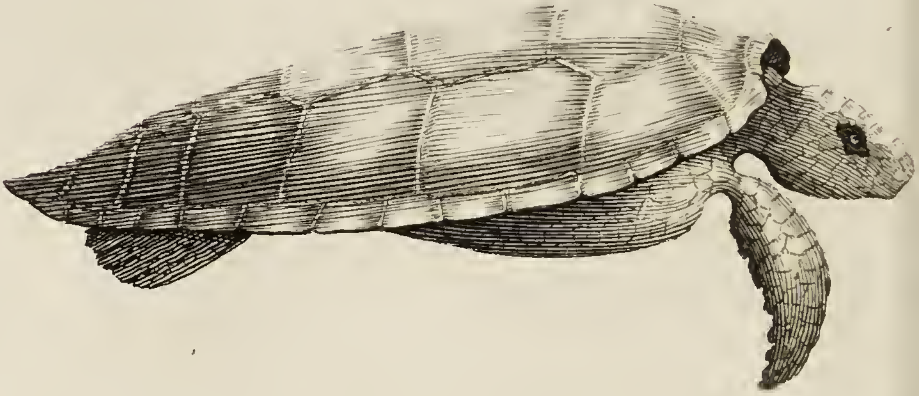
The tail is bifurcated.

The *Gar-pike,* or *Sea-needle,* (See pl. LXXXVII.) comes in ſhoals on our coaſts, and precedes the mackrel. It reſembles that fiſh in flavour, but is diſtinguiſhed from all of the kind by the back-bone, which turns a fine light green when the fiſh is boiled. It ſometimes grows to the length of three feet. The jaws are exceeding long, ſlender, and pointed, and the edges of them are armed with numbers of ſhort ſlender teeth. It is ſometimes known by the name of the *horn-fiſh.* The tail is forked.

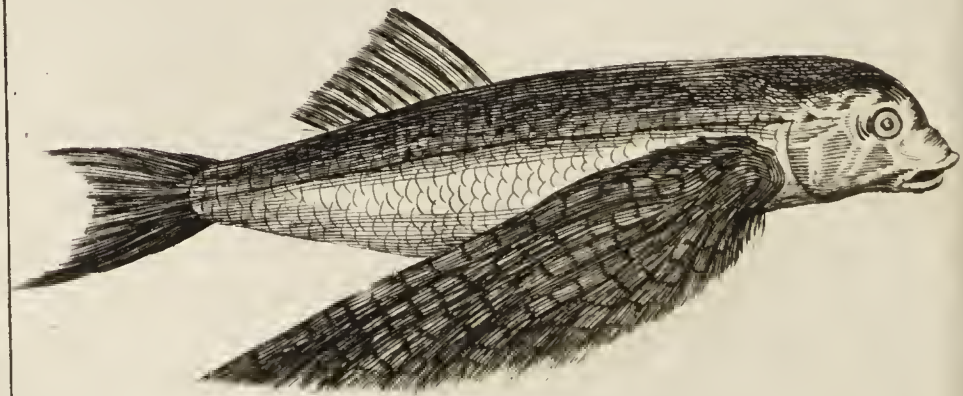
The *Saury-pike* is about eleven inches long, and its jaws are protracted like thoſe of the ſea-needle. The body alſo reſembles that of an eel, but like the mackrel, it has a number of ſmall fins near the tail, which is forked.



The Land Tortoiſe *p. 228.*



The Sea Tortoiſe *or* Turtle *p.230.*



The Flying Fiſh *p.203.*

The Argentine is a ſmall fiſh between two and three inches long. The body is compreſſed, and almoſt of an equal breadth to the anal fin. The back is of a duſky green, the ſides and covers of the gills as if plated with ſilver. It is taken in the ſea.

The Atherine is common in the ſea near Southampton, where it is called a ſmelt. It never deſerts the place, and is conſtantly taken, except in hard froſt. It is about four inches in length, the back ſtraight, the belly a little protuberant. Its colour is ſilvery, tinged with yellow, and below the ſide-line is a row of black ſpots. It is ſemi-pellucid.

The Mullet was formerly much celebrated as a treat for the epicure, and frequent alluſions to it are found in the ancient ſatyriſts. It is a fiſh of an elegant form; is generally found by the ſea ſhores, where it roots like a hog in the ſand or mud, and it is ſo active, that it frequently eſcapes, by leaping out of the fiſhermen's nets. The head is almoſt ſquare, and is flat at the top. It has no teeth, only in the upper lip is a ſmall roughneſs. The tail is much forked. The colour of the back is duſky, marked with blue and green. The ſides ſilvery, marked with duſky lines, reaching from the head to the tail. The belly is ſilvery.

Of the Flying Fish (See pl. LXXXIX.) ſo much has been ſaid under the article dorado, that it is only neceſſary in this place to add a ſhort deſcription of it.

The body of this fiſh is oblong; the head is almoſt three-cornered; the fin covering the gills with ten rays; the pectoral fins placed high, and as long as the whole body; the back fin at the extremity of the back. The tail is bifurcated.

The Herring is a fiſh too well known to require a deſcription. The genus includes, however, ſome ſpecies leſs generally diffuſed, ſuch as the pilchard, the ſhad, the anchovy, &c.

The *Pilchard* is thicker and rounder than the herring. The noſe is ſhorter in proportion, and turns up. The back is more elevated, the belly leſs ſharp. The back fin of the pilchard is placed exactly in the centre of gravity, ſo that when taken up by it, the fiſh exactly preſerves an equilibrium, whereas that of the herring dips at the head. The ſcales of the pilchard adhere very cloſely, whereas thoſe of the herring very eaſily drop off. The pilchard is in general leſs than the herring, and is fatter and fuller of oil.

Of all migrating fiſh, the *Herring* and the *Pilchard* take the moſt adventurous voyages. Herrings are found in the greateſt abundance in the higheſt northern latitudes. In thoſe inacceſſible ſeas, that are covered with ice for a great part of the year, the herring and pilchard find a quiet and ſure retreat from all their numerous enemies: thither neither man, nor their ſtill more deſtructive enemy, the fin-fiſh, or the cachalot, dares to purſue them. The quantity of inſect food which thoſe ſeas ſupply, is very great; whence, in that remote ſituation, defended by the icy rigour of the climate, they live at eaſe, and multiply beyond expreſſion. From this moſt deſirable retreat, Anderſon ſuppoſes they would never depart, but that their numbers render it neceſſary for them to migrate; and, as bees from a hive, they are compelled to ſeek for other retreats.

For this reaſon, the great colony is ſeen to ſet out from the icy ſea about the middle of winter; compoſed of ſuch numbers, that if all the men in the world were to be loaded with herrings, they would not carry the thouſandth part away. But they no ſooner leave their retreats, but millions of enemies appear to thin their ſquadrons. The fin-fiſh and the cachalot ſwallow barrels at a yawn; the porpeſs, the grampus, the ſhark, and the whole numerous tribe of dog-fiſh, find them an eaſy prey, and deſiſt from making war upon each other: but ſtill more, the unnumbered flocks of ſea-fowl that chiefly inhabit near the pole, watch the outſet of their dangerous migration, and ſpread extenſive ruin.

In this exigence, the defenceleſs emigrants find no other ſafety, but by crouding cloſer together, and leaving to the outmoſt bands the danger of being the firſt devoured; thus, like ſheep when frighted, that always run together in a body, and each finding ſome protection in being but one of many that are equally liable to invaſion, they are ſeen to ſeparate into ſhoals, one body of which moves to the weſt, and pours down along the coaſts of America, as far ſouth as Carolina, and but ſeldom farther. In Cheſepeak Bay, the annual inundation of theſe fiſh is ſo great, that they cover the ſhores in ſuch quantities as to become a nuiſance. Thoſe that hold more to the eaſt, and come down towards Europe, endeavour to ſave themſelves from their mercileſs purſuers, by approaching the firſt ſhore they can find; and that which firſt offers in their deſcent, is the coaſt of Iceland, in the beginning of March. Upon their arrival on that coaſt, their phalanx, which has already ſuffered conſiderable diminutions, is, nevertheleſs, of amazing extent, depth, and cloſeneſs, covering an extent of ſhore as large as the iſland itſelf. The whole water ſeems alive; and is ſeen ſo black with them at a great diſtance, that the number ſeems inexhauſtible.

That body which comes upon our coaſts, begins to appear off the Shetland Iſles in April. Theſe are the forerunners of the grand ſhoal which deſcends in June; while its arrival is eaſily announced, by the number of its greedy attendants, the gannet, the gull, the ſhark, and the porpeſſes. When the main body is arrived, its breadth and depth is ſuch, as to alter the very appearance of the ocean. It is divided into diſtinct columns, of five or ſix miles in length, and three or four broad; while the water before them curls up, as if forced out of its bed. Sometimes they ſink for the ſpace of ten or fifteen minutes, then riſe again to the ſurface; and, in bright weather, reflect a variety of ſplendid colours, like a field beſpangled with purple, gold and azure. The fiſhermen are ready prepared to give them a proper reception; and, by nets made for the occaſion, they take ſometimes above two thouſand barrels at a ſingle draught.

The *Sprat* is now generally allowed not to be the fry of the herring, as, from its great reſemblance, was formerly ſuppoſed. The back fin of the ſprat is more remote from the noſe than that of the herring; but a principal diſtinction is, that the belly of both the herring and pilchard is quite ſmooth, whereas that of the ſprat is ſerrated. The herring has fifty-ſix vertebræ, the ſprat only forty-eight. The ſprat ſeldom exceeds five inches in length.

The *Anchovy* is about ſix inches and a half in length. The body is ſlender, but thicker in proportion than the herring. The ſcales are large, and eaſily fall off. The back is green, and ſemipellucid, the ſides and belly ſilvery; and the tail forked.

The *Shad* is taken in many rivers; thoſe of the Severn are moſt eſteemed, and are diſtinguiſhed by the London fiſhmongers by the French name of *Aloſſe*. The Thames ſhad is a very inſipid coarſe fiſh. The Thames ſhad, when it viſits the Severn, is called the *twaite*, and is held in great diſrepute.

The difference between the two kinds are as follow:—The true *ſhad* weighs from four to eight pounds; the *twaite* from half a pound to two. The twaite may alſo be known from a ſmall ſhad, by having one or more black ſpots on the ſides, when it has only one, it is always near the gill.

The ſhad in form rather reſembles the herring, but is larger and thinner, or more compreſſed in proportion. The head ſlopes conſiderably from the back; and the under jaw is longer than the upper.

THE CARP is a genus, which, beſides the fiſh which bears that name, includes ſeveral others, well known to anglers, viz. the barbel, the gudgeon, the crucian, the bream, the tench, the roach, dace, &c.

The *carp* is one of the naturalized fiſh in England, having been introduced there by Leonard Maſchal, about the year 1514, to whom the Engliſh were alſo indebted for that excellent apple the pepin. The many good things which that iſland wanted before that period, are enumerated in this old diſtich:

Turkies, carps, hops, pickerel, and beer,
Came into England all in one year.

As to the two laſt articles we have ſome doubts, the others we believe to be true. Ruſſia wants theſe fiſh at this day; Sweden has them only in the ponds of the people of faſhion; Poliſh Pruſſia is the chief ſeat of the carp; they abound in the rivers and lakes of that country, particularly in the Friſch and Curiſch-haff, where they are taken of a vaſt ſize. They are there a great article of commerce, and ſent in well-boats to Sweden and Ruſſia. The merchants purchaſe them out of the waters of the nobleſſe of the country, who draw a good revenue from this article. Neither are there wanting among our gentry, inſtances of ſome who make good profit of their ponds.

The ancients do not ſeparate the carp from the ſea-fiſh. We are credibly informed that they are ſometimes found in the harbour of Dantzick, between the town and a ſmall place called Hela.

Carp are very long lived. Geſner brings an inſtance of one that was an hundred years old. They alſo grow to a very great ſize. On our own knowledge we can ſpeak of none that exceeded twenty pounds in weight; but Jovius ſays, that they were ſometimes taken in the Lacus Larius (the Lago di Como) of two hundred pounds weight; and Rzaczynſki mentions others taken in the Dneiſter that were five feet in length.

The carp is a prodigious breeder: its quantity of roe has been ſometimes found ſo great, that when taken out and weighed againſt the fiſh itſelf, the former has been found to preponderate. From the ſpawn of this fiſh caviare is made for the Jews, who hold the ſturgeon in abhorrence.

Theſe fiſh are extremely cunning, and on that account are by ſome ſtyled the *river fox*. They will ſometimes leap over the nets, and eſcape that way; at others, will immerſe themſelves ſo deep in the mud, as to let the net paſs over them. They are alſo very ſhy of taking a bait; yet at the ſpawning time they are ſo ſimple, as to ſuffer themſelves to be tickled, handled, and caught by any body that will attempt it.

This fiſh is apt to mix its milt with the roe of other fiſh, from which is produced a ſpurious breed; we have ſeen the offspring of the carp and tench, which bore the greateſt reſemblance to the firſt: have alſo heard of the ſame mixture between the carp and bream.

The carp is of a thick ſhape; the ſcales very large, and when in beſt ſeaſon of a fine gilded hue.

The jaws are of equal length; there are two teeth in the jaws, or on the tongue; but at the entrance of the gullet, above and below, are certain bones that act on each other, and comminute the food before it paſſes down.

On each ſide of the mouth is a ſingle beard; above thoſe on each ſide another, but ſhorter: the dorſal fin extends far towards the tail, which is a little bifurcated; the third ray of the dorſal fin is very ſtrong, and armed with ſharp teeth, pointing downwards; the third ray of the anal fin is conſtructed in the ſame manner.

The *Barbel* was ſo extremely coarſe, as to be overlooked by the ancients till the time of Auſonius, and what he ſays is no panegyric on it; for he lets us know it loves deep waters, and, that when it grows old, it was not abſolutely bad.

It frequents the ſtill and deep parts of rivers, and lives in ſociety, rooting like ſwine with their noſes in the ſoft banks. It is ſo tame as to ſuffer itſelf to be taken with the hand; and people have been known to take numbers by diving for them. In ſummer they move about during night in ſearch of food, but towards autumn, and during winter, confine themſelves to the deepeſt holes.

They are the worſt and coarſeſt of freſh-water fiſh, and ſeldom eaten but by the poorer ſort of people, who ſometimes boil them with a bit of bacon, to give them a reliſh. The roe is very noxious, affecting thoſe who unwarily eat of it with a nauſea, vomiting, purging, and a ſlight ſwelling.

It is ſometimes found of the length of three feet, and eighteen pounds in weight: it is of a long and rounded form: the ſcales not large.

Its head is ſmooth; the noſtrils placed near the eyes; the mouth is placed below; on each corner is a ſingle beard, and another on each ſide the noſe.

The dorſal fin is armed with a remarkably ſtrong ſpine, ſharply ſerrated, with which it can inflict a very ſevere wound on the incautious handler, and even do much damage to the nets.

The pectoral fins are of a pale brown colour; the ventral and anal tipped with yellow; the tail a little bifurcated, and of a deep purple; the ſide line is ſtraight.

The ſcales are of a pale gold colour, edged with black; the belly is white.

The *Tench* underwent the ſame fate with the barbel, in reſpect to the notice taken of it by the early writers: and even Auſonius, who firſt mentions it, treats it with ſuch diſreſpect, as evinces the great capriciouſneſs of taſte; for that fiſh, which at preſent is held in ſuch good repute, was in his days the repaſt only of the canaille.

It has been by ſome called the Phyſician of the fiſh, and the ſlime ſo healing, that the wounded apply it as a ſtyptic.

Whatever virtue its ſlime may have to the inhabitants of the water, we will not vouch for, but its fleſh is a wholeſome and delicious food to thoſe of the earth. The Germans are of a different opinion. By way of contempt they call it ſhoemaker. Geſner even ſays, that it is inſipid and unwholeſome.

It does not commonly exceed four or five pounds in weight, but we have heard of one that weighed ten pounds; Salvianus ſpeaks of ſome that arrived at twenty pounds.

They love ſtill waters, and are rarely found in rivers; they are very fooliſh, and eaſily caught.

The tench is thick and ſhort in proportion to its length; the ſcales are very ſmall, and covered with ſlime.

The irides are red; there is ſometimes, but not always, a ſmall beard at each corner of the mouth.

The colour of the back is duſky; the dorſal and ventral fins of the ſame colour; the head, ſides and belly of a greeniſh caſt, moſt beautifully mixed with gold, which is in its greateſt ſplendour when the fiſh is it the higheſt ſeaſon.

The tail is quite even at the end, and very broad.

Ariſtotle mentions the *Gudgeon* in two places, once as a river fiſh, again as a ſpecies that was gregarious; and in a third place he deſcribes it as a ſea fiſh.

This fiſh is generally found in gentle ſtreams, and is of a ſmall ſize; thoſe few, however, that are caught in the Kennet and Cole, are three times the weight of thoſe taken elſewhere. The largeſt we ever heard of was taken near Uxbridge, and weighed half a pound.

They bite eagerly, and are aſſembled by raking the bed of the river; to this ſpot they immediately crowd in ſhoals, expecting food from this diſturbance.

The ſhape of the body is thick and round; the irides tinged with red; the gill covers with green and ſilver; the lower jaw is ſhorter than the upper; at each corner of the mouth is a ſingle beard; the back olive, ſpotted with black; the ſide-line ſtrait; the ſides beneath that ſilvery; the belly white.

The tail is forked; that, as well as the dorſal fin, is ſpotted with black.

The *Bream* is an inhabitant of lakes, or the deep parts of ſtill rivers. It is a fiſh that is very little eſteemed, being extremely inſipid.

It is extremely deep, and thin in proportion to its length. The back riſes much, and is very ſharp at the top. The head and mouth are ſmall; on ſome we examined in the ſpring, were abundance of minute whitiſh tubercles; an accident which Pliny ſeems to have obſerved befals the fiſh of the Lago Maggiore, and Lago di Como. The ſcales are very large; the ſides flat and thin.

The dorſal fin has eleven rays, the ſecond of which is the longeſt; that fin, as well as all the reſt, are of a duſky colour; the back of the ſame hue; the ſides yellowiſh.

The tail is very large, and of the form of a creſcent.

The *Rud* is found in the Charwell, near Oxford, in the Fens near Holderneſs. The body is extremely deep, like that of the bream, but much thicker. The head is ſmall; the back vaſtly arched; the ſcales very large. The back is of an olive colour, the ſides and belly gold; the ventral and anal fins, and the tail of a deep red. It appears to be the ſame fiſh with the *ſhallow* of the Cam.

The *Crucian* is common in many of the fiſh-ponds about London, and other parts of the South of England; but we believe is not a native fiſh.

It is very deep and thick; the back is much arched; the dorſal fin conſiſts of nineteen rays; the two firſt ſtrong and ſerrated. The pectoral fins have (each) thirteen rays; the ventral nine; the anal ſeven or eight; the lateral line parallel with the belly; the tail almoſt even at the end.

The colour of the fiſh in general is a deep yellow; the meat is coarſe, and little eſteemed.

'Sound as a *Roach*,' is a proverb that appears to be but indifferently founded, that fiſh being not more diſtinguiſhed for its vivacity than many others; yet it is uſed by the French as well as the Engliſh, who compare people of ſtrong health to the *gordon*, or roach.

It is a common fiſh, found in many of our deep ſtill rivers, affecting, like the others of this genus, quiet waters. It is gregarious, keeping in large ſhoals. We have never ſeen them very large. Old Walton ſpeaks of ſome that weighed two pounds. In a liſt of fiſh ſold in the London markets, with the greateſt weight of each, communicated to us by an intelligent fiſhmonger, theſe is mention of one whoſe weight was five pounds.

The roach is deep, but thin, and the back is much elevated, and ſharply ridged; the ſcales large, and fall off very eaſily. Side-line bends much in the middle towards the belly.

The *Dace*, like the roach, is gregarious, haunts the ſame places, is a great breeder, very lively, and during ſummer is very fond of frolicking near the ſurface of the water. This fiſh, and the roach, are coarſe and inſipid meat.

Its head is ſmall; the irides of a pale yellow; the body long and ſlender; its length ſeldom above ten inches, though in the above-mentioned liſt is an account of one that weighed a pound and an half; the ſcales ſmaller than thoſe of the roach.

The back is varied with duſky, with a caſt of a yellowiſh green; the ſides and belly ſilvery; the dorſal fin duſky; the ventral, anal, and caudal fins red, but leſs ſo than thoſe of the former; the tail is very much forked.

The *Chub*. Salvianus imagines this fiſh to have been the *ſqualus* of the ancients, and grounds his opinion on a ſuppoſed error in a certain paſſage in Columella and Varro, where he would ſubſtitute the word *ſqualus* inſtead of *ſcarus*.

That the *ſcarus* was not our *chub*, is very evident; not only becauſe the chub is entirely an inhabitant of freſh waters, but likewiſe it ſeems improbable that the Romans would give themſelves any trouble about the worſt of river fiſh; when they neglected the moſt delicious kinds; all their attention was directed towards thoſe of the ſea; the difficulty of procuring them ſeems to have been the criterion of their value, as is ever the caſe with effete luxury.

The chub is a very coarſe fiſh, and full of bones; it frequents the deep holes of rivers, and, during ſummer, commonly lies on the ſurface, beneath the ſhade of ſome tree or buſh. It is a very timid fiſh, ſinking to the bottom on the leaſt alarm, even at the paſſing of a ſhadow, but they will ſoon reſume their ſituation. It feeds on worms, caterpillars, graſshoppers, beetles, and other coleopterous inſects that happen to fall into the water; and it will even feed on cray-fiſh. This fiſh will riſe to a fly.

This fiſh takes its name from its head, not only in the Engliſh, but in other languages; it is called *chub*, according to Skinner, from the old Engliſh, *cop*, a head; the French, in the ſame names call it *teſtard*; the Italians, *capitone*.

It does not grow to a large ſize; we have known ſome that weighed above five pounds; but Salvianus ſpeaks of others that were eight or nine pounds in weight.

The body is oblong, rather round, and of a pretty equal thickneſs the greateſt part of the way; the ſcales are large.

The irides ſilvery; the cheeks of the ſame colour; the head and back of a deep duſky green; the ſides ſilvery, but in the ſummer yellow; the belly white; the pectoral fins of a pale yellow; the ventral and anal fins red; the tail a little forked, of a browniſh hue, but tinged with blue at the end.

The *Bleak* is very common in many of our rivers, and keep together in large ſhoals. Theſe fiſh ſeem at certain ſeaſons to be in great agonies; they tumble about near the ſurface of the water, and are incapable of ſwimming far from the place, but in about two hours recover, and diſappear. Fiſh thus affected, the Thames fiſhermen call *mad bleaks*. They ſeem to be troubled with a ſpecies of *gordius* or hair-worm, of the ſame kind with thoſe which Ariſtotle ſays that the *ballerus* and *tillo* are infeſted with, which torments them, ſo that they riſe to the ſurface of the water, and then die.

Artificial pearls are made with the ſcales of this fiſh, and we think of the dace. They are beaten into a fine powder, then diluted with water, and introduced into a thin glaſs bubble, which is afterwards filled with wax. The French were the inventors of this art. Dr. Liſter tells us, that when he was at Paris, a certain artiſt uſed in one winter thirty hampers full of fiſh in this manufacture.

The bleak ſeldom exceeds five or ſix inches in length; their body is ſlender, greatly compreſſed ſideways, not unlike that of the ſprat.

The eyes are large; the irides of a pale yellow; the under jaw the longeſt; the lateral line crooked; the gills ſilvery; the back green; the ſides and belly ſilvery; the fins pellucid; the ſcales fall off very eaſily; the tail much forked.

During the month of July there appear in the Thames, near Blackwall and Greenwich, innumerable multitudes of ſmall fiſh, which are known to the Londoners by the name of *White Bait*. They are eſteemed very delicious when fried with fine flour, and occaſion, during the ſeaſon, a vaſt reſort of the lower order of epicures to the taverns contiguous to the places they are taken at.

There are various conjectures about this ſpecies, but all terminate in a ſuppoſition, that they are the fry of ſome fiſh, but few agree to which kind they owe their origin. Some attribute it to the ſhad, others to the ſprat, the ſmelt, and the bleak. That they neither belong to the ſhad, nor the ſprat, is evident from the number of branchioſtegous rays, which in thoſe are eight, in this only three. That they are not the young of ſmelts is as clear, becauſe they want the *pinna adipoſa*, or rayleſs fin; and that they are not the offspring of the bleak is extremely probable, ſince we never heard of the white bait being found in any other river, notwithſtanding the bleak is very common in ſeveral of the Britiſh ſtreams: but as the white bait bears a greater ſimilarity to this fiſh than to any other we have mentioned, we give it a place here as an appendage to the bleak, rather than form a diſtinct article of a fiſh which it is impoſſible to claſs with certainty.

It is evident that it is of the carp or *cyprinus* genus; it has only three branchioſtegous rays, and only one dorſal fin; and in reſpect to the form of the body, is compreſſed like that of the bleak.

Its uſual length is two inches; the under jaw is the longeſt; the irides ſilvery, the pupil black; the dorſal fin is placed nearer to the head than to the tail, and conſiſts of about fourteen rays; the ſide line is ſtrait; the tail forked, the tips black.

The head, ſides, and belly, are ſilvery; the back tinged with green.

The *Minow* is frequently in many of our ſmall gravelly ſtreams, where they keep in ſhoals.

The body is ſlender and ſmooth, the ſcales being extremely ſmall. It ſeldom exceeds three inches in length.

The lateral line is of a golden colour; the back flat, and of a deep olive; the ſides and belly vary greatly in different fiſh; in a few are of a rich crimſon, in others bluiſh, in others white. The tail is forked, and marked near the baſe with a duſky ſpot.

The *Gold Fiſh.* Theſe fiſh are now quite naturalized in Europe, and breed as freely in the open waters as the common carp.

They were firſt introduced into England about the year 1691, but were not generally known till 1728, when a great number were brought over, and preſented firſt to Sir Matthew Dekker, and by him circulated round the neighbourhood of London, whence they have been diſtributed to moſt parts of the country.

In China the moſt beautiful kinds are taken in a ſmall lake in the province of Che-Kyang. Every perſon of faſhion keeps them for amuſement, either in porcelaine veſſels, or in the ſmall baſons that decorate the courts of the Chineſe houſes. The beauty of their colours, and their lively motions, give great entertainment, eſpecially to the ladies, whoſe pleaſures, by reaſon of the cruel policy of that country, are extremely limited.

In form of the body they bear a great reſemblance to a carp. They have been known in Europe to arrive at the length of eight inches; in their native place they are ſaid to grow to the ſize of our largeſt herring.

The noſtrils are tubular, and form a ſort of appendages above the noſe; the dorſal fin and the tail vary greatly in ſhape; the tail is naturally bifid, but in many is trifid, and in ſome even quadrifid; the anal fins are the ſtrongeſt characters of this ſpecies, being placed not behind one another, like thoſe of other fiſh, but oppoſite each other, like the ventral fins.

The colours vary greatly; ſome are marked with a fine blue, with brown, with bright ſilver; but the general predominant colour is gold, of a moſt amazing ſplendour; but their colours and form need not be dwelt on, ſince thoſe who want opportunity of ſeeing the living fiſh, may ſurvey them expreſſed in the moſt animated manner, in the works of Mr. George Edwards.

Angling is a very common amuſement in theſe parts of the world, and is peculiarly agreeable to young perſons of a contemplative turn. As this is the caſe, we ſhall preſent our readers with a ſhort abſtract of all that is neceſſary to be known on that ſubject, and which will prove of more real uſe to the young ſportſman, than the moſt elaborate treatiſe of angling.

Deſcription of proper baits for fiſh, with a table of the different ſpecies, and the modes of catching them.

Flies.] 1. Stone-fly, found under hollow ſtones at the ſides of rivers, is of a brown colour, with yellow ſtreaks on the back and belly, has large wings, and is in ſeaſon from April to July. 2. Green drake, found among ſtones by river ſides, has a yellow body ribbed with green, is long and ſlender, with wings like a butterfly, his tail turns on his back, and from May to Midſummer is very good. 3. Oak-fly, found in the body of an old oak or aſh, with its head downwards, is of a brown colour, and excellent from May to September. 4. Palmer-fly or worm, found on leaves of plants, is commonly called a *caterpillar*, and when it comes to a fly is excellent for trout. 5. Ant-fly, found in ant-hills from June to September. 6. The May-fly is to be found playing at the river-ſide, eſpecially againſt rain. 7. The black fly is to be found upon every hawthorn after the buds are come off.

Paſtes.] 1. Take the blood of ſheeps hearts, and mix it with honey and flour worked to a proper conſiſtence. 2. Take old cheeſe grated, a little butter ſufficient to work it, and colour it with ſaffron: in winter uſe ruſty bacon inſtead of butter. 3. Crumbs of bread chewed or worked with honey or ſugar, moiſtened with gum-ivy water. 4. Bread chewed, and worked in the hand till ſtiff.

Worms.] 1. The earth-bob, found in ſandy ground after ploughing, it is white, with a red head, and bigger than a gentle; another is found in heathy ground, with a blue head. Keep them in an earthen veſſel well covered, and a ſufficient quantity of the mold they harbour in. They are excellent from April to November. 2. Gentles, to be had from putrid fleſh: let them lie in wheat-bran a few days before uſed. 3. Flag-worms, found in the roots of flags; they are of a pale yellow colour, are larger and thinner than a gentle, and muſt be ſcowered like them. 4. Cow-turd-bob, or clap-bait, found under a cow-turd from May to Michaelmas; it is like a gentle, but larger. Keep it in its native earth like the earth-bob. 5. Cadis worm, or cod-bait, found under looſe ſtones in ſhallow rivers; they are yellow, bigger than a gentle, with a black or blue head, and are in ſeaſon from April to July. Keep them in flannel bags. 6. Lob-worm, found in gardens; it is very large, and has a red head, a ſtreak down the back, and a flat broad tail. 7. Marſh-worms, found in marſhy ground; keep them in moſs ten days before you uſe them: their colour is a bluiſh red, and are a good bait from March to Michaelmas. 8. Brandling red-worms, or blood-worms found in rotten dung-hills and tanners bark; they are ſmall red worms, very good for all ſmall fiſh, have ſometimes a yellow tail, and are called *tag-tail.*

Fiſh and Inſects.] 1. Minnow. 2. Gudgeon. 3. Roach. 4. Dace. 5. Smelt. 6. Yellow frog. 7. Snail Slit. 8. Graſshopper.

The fly is either *natural* or *artificial.*

I. *Natural* flies are innumerable. The more uſual for this purpoſe are mentioned in the preceding page.

There are two ways of fiſhing with natural flies; either on the ſurface of the water, or a little underneath it.

In angling for chub, roach, or dace, move not your natural fly ſwiftly, when you ſee the fiſh make at it; but rather let it glide freely towards him with the ſtream: but if it be in a ſtill and ſlow water, draw the fly ſlowly ſide-wiſe by him, which will make him eagerly purſue.

II. The *artificial* fly is ſeldom uſed but in bluſtering heather, when the waters are ſo troubled by the winds, wat the natural fly cannot be ſeen, nor reſt upon them. Of this artificial fly there are reckoned no leſs than 12 ſorts, of which the following are the principal.

1. For March, the dun fly; made of dun-wool, and the feathers of the partridge's wing; or the body made of black wool, and the feathers of a black drake. 2. For April, the ſtone-fly; the body made of black wool, dyed yellow under the wings and tail. 3. For the beginning of May, the ruddy fly; made of red wool, and bound about with black ſilk, with the feathers of a black capon hanging dangling on his ſides next his tail. 4. For June, the greeniſh fly; the body made of black wool, with a yellowg liſt on either ſide, the wings taken off the wings of a buzzard, bound with black broken hemp. 5. The mooriſh fly, the body made of duſkiſh wool, and the wings of the blackiſh mail of a drake. 6. The tawny-fly, good till the middle of June; the body made of tawny wool, the wings made contrary one againſt the other; of the whitiſh mail of a white drake. 7. For July, the waſp-fly; the body made of black wool, caſt about with yellow ſilk, and the wings of drakes feathers. 8. The ſteel-fly, good in the middle of July; the body made with greeniſh wool, caſt about with the feathers of a peacock's tail, and the wings made of thoſe of the buzzard. 9. For Auguſt, the drake-fly; the body made with black wool, caſt about with black ſilk; his wings of the mail of a black drake, with a black head.

The beſt rules for artificial fly-fiſhing are,

1. To fiſh in a river ſomewhat diſturbed with rain: or in a cloudy day, when the waters are moved by a gentle breeze: the ſouth wind is beſt; and if the wind blow high, yet not ſo but that you may conveniently guard your tackle, the fiſh will riſe in plain deeps; but if the wind be ſmall, the beſt angling is in ſwift ſtreams. 2. Keep as far from the water-ſide as may be; fiſh down the ſtream with the ſun at your back, and touch not the water with your line. 3. Ever angle in clear rivers, with a ſmall fly and ſlender wing; but in muddy places uſe a larger. 4. When, after rain, the water becomes browniſh, uſe an orange fly; in a clear day, a light-coloured fly; a dark fly for dark waters, &c. 5. Let the line be twice as long as the rod, unleſs the river be encumbered with wood. 6. For every ſort of fly, have ſeveral of the ſame, differing in colour, to ſuit with the different complexions of ſeveral waters and weathers. 7. Have a nimble eye, and active hand, to ſtrike preſently with the riſing of the fiſh; or elſe he will be apt to ſpue out the hook. 8. Let the fly fall firſt into the water, and not the

line, which will ſcare the fiſh. 9. In ſlow rivers, or ſtill places, caſt the fly acroſs the river, and let it ſink a little in the water, and draw it gently back with the current.

Salmon-flies ſhould be made with their wings ſtanding one behind the other, whether two or four. This fiſh delights in the gaudieſt colours that can be; chiefly in the wings, which muſt be long, as well as the tail.

The above rules for fly-fiſhing chiefly reſpect *trout*, which indeed of all fiſh furniſh the moſt excellent ſport in this way.

Bait fiſhing is performed in two ways. 1ſt. On the ground with a long lead ſinker, nicely fixed to the line, at about nine inches from the hook, which is neceſſary in ſtrong running ſtreams or ſhallows, and is chiefly employed for trout; and then the angler feels the fiſh bite by his pulling at the line. 2dly. By means of a float, which is commonly made of cork or quill, and is proper in ſtill or deep waters. In this caſe, it is abſolutely neceſſary to plumb the depth, and adjuſt the hook to the proper depth according to the annexed table.

Much of the ſucceſs in bottom or bait fiſhing, depends on the angler having a quick eye and hand, and ſtriking at the proper time. Roach, dace, bleak and gudgeons muſt be ſtruck at the firſt nibble. Perch, tench and trout muſt be allowed a certain time; and pike ſtill longer, for theſe latter too you muſt always fiſh with ſtrong tackle and a bait of wire near the hook. In fiſhing for roach, dace, barbel, carp or bleak, you muſt always previouſly throw into the part of the river or pond where you mean to fiſh, a quantity of ground bait (bran and bread mixed into a paſte and ſunk with a ſtone, or chandlers greaves) which brings the fiſh together and keeps them from wandering.

An Epitome of the whole art of Fiſhing, wherein is ſhewn (at one view) the harbours, ſeaſons, and depths for catching all ſorts of fiſh uſually angled for; alſo the various baits for each, ſo digeſted, as to contain the eſſence of all the treatiſes ever written on the ſubject, exempt from the ſuperfluities, which tend more to perplex than inſtruct.

Names.	Where found.	Seaſon.	Time to ang.	Depth from ground.	Proper Baits.			
					Flies. No.	Paſtes. No.	Worms. No.	Fiſh and Inſects. No.
Bream	rough ſtr. river or mid. pond	Apr. to Mich.	Sun-riſe to 9 3 to Sun-ſet	touch ground	—	1 3	1 to 7	8
Barbel	gravel-banks in currents under bridges	Apr. to Aug.	very early or late	ditto	—	2	2 6 7	—
Bleak	ſandy bottom, deep rivers, ſhips ſterns	May to Oct.	all day	6 inches from bottom	1 2	2	2 3 8	—
Carp	ſtill deep mud-bottom, pond or river	May to Aug.	Sun-riſe to 9 3 to Sun-ſet	3 inches from bottom hot weather, mid-water	—	1 3 4	1 2 3 4 7	—
Chub or Chevin	ditto	May to Dec.	ditto	ditto	1 to 5	2	1 2, 4 5	7 8
Dace	ſandy bottom, deep rivers, ſhips ſterns	May to Oct.	all day	6 to 12 inches from bottom	ditto	3 4	1 to 5 & 8	—
Gudgeon	gravel ſhoals	May to Oct.	ditto	near or on ground	—	ditto	2 8	—
Pike	near clay-banks	All the year.	ditto	mid-water	wh. ſtro. and ſnap	line float hook fixt	on ſhore	1 2 3 4 5 6 7
Perch	river in ſtream } gravel or weedy bottom	May to Aug.	S.-riſe to 10 2 to Sun-ſet	ditto	2	1	3 5 7 8	1 6
	pond deepeſt part } gravel or weedy bottom	Aug. to May.	mid-day	6 inches from botttom				
Pope or Ruff	deep holes in rivers	May to Oct.	all day	ditto	5	— —	all	— —
Roach	ſandy bottom, deep rivers, ſhips ſterns	May to Oct.	ditto	6 to 12 inches	1 2 4 5	3 4	ditto	8
Salmon	deep rivers	Mar. to Sept.	8 to 9, 3 to 6	mid-way to the bottom	all large	— —	1 5 6 7	1
Smelts	ſhips ſterns and docks	Apr. to Oct.	all day	mid-way to the bottom variable	all ſmall	— —	1 2 5	bits of ſmelts.
Trout	purling ſtream and eddies of ſtony bottom river	Mar. to Mich.	ditto	cold weather, 6 inches to 9 hot weather, top to mid-wat.	1 to 5	—	1 2 5 to 8	1 8
Tench	mud-bottom river or pond	All the year.	Sun-riſe to 9 3 to ſun-ſet	cold weat. 3 inch from bot. hot weather mid-water	— —	1 3 4	1 3 4 to 7	— —
Umber or Grayling	clay bottom, ſwift ſtream	All the year.	all day	cold weather, 6 to 9 inches hot weather, top to mid-wat.	1 to 5	— —	all	1 8

Happy England! (ſys an elegant writer) where the ſea furniſhes an abundant and luxurious repaſt, and the freſh waters an innocent and harmleſs paſtime; where the angler, in cheerful ſolitude, ſtrolls by the edge of the ſtream, and fears neither the coiled ſnake, nor the lurking crocodile; where he can retire at night, with his few trouts, to borrow the charming deſcription of Old Walton, to ſome friendly cottage, where the landlady is good, and the daughter innocent and beautiful; where the room is cleanly, with lavender in the ſheets, and twenty ballads ſtuck about the wall! There he can enjoy the company of a talkative brother ſportſman, have his trouts dreſſed for ſupper, tell tales, ſing old tunes, or make a catch! There he can talk of the wonders of nature, with learned admiration, or find ſome harmleſs ſport to content him, and paſs away a little time, without offence to God, or injury to man!

CHAP. XXXII.

Of Shell-fiſh in general.—The Cruſtaceous Kind—The LOBSTER*—The ſpiny Lobſter—The* CRAB*—The Land-crab—The Violet Crab—The Soldier Crab—The* TORTOISE*—The Land Tortoiſe—The Turtle—Of Teſtaceous Fiſhes—Of the* TURBINATED, *or Snail Kind—The Garden Snail—The Freſh-water Snail—The Sea Snail—The Nautilus—Of* BIVALVED *Fiſh—The Muſcle—The Oyſter—The Cockle—The Scollop—The Razor Fiſh—Of Pearls, and the Fiſhery—Of* MULTIVALVE *Shell Fiſh—The Sea Urchin—The Pholades.*

THERE are two claſſes of animals, inhabiting the water, which commonly receive the name of fiſhes, entirely different from thoſe we have been deſcribing, and alſo very diſtinct from each other. Theſe are divided by naturaliſts into Cruſtaceous and Teſtaceous animals: both, totally unlike fiſhes in appearance, ſeem to invert the order of nature; and as thoſe have their bones on the inſide, and their muſcles hung upon them for the purpoſes of life and motion, theſe, on the contrary, have all their bony parts on the outſide, and all their muſcles within. Not to talk myſteriouſly—all who have ſeen a lobſter or an oyſter, perceive that the ſhell in theſe bears a ſtrong analogy to the bones of other animals; and, that, by theſe ſhells, the animal is ſuſtained and defended.

Cruſtaceous fiſh, ſuch as the crab and the lobſter, have a ſhell not quite of a ſtony hardneſs, but rather reſembling a firm cruſt, and in ſome meaſure capable of yielding. Teſtaceous fiſhes, ſuch as the oyſter or cockle, are furniſhed with a ſhell of a ſtony hardneſs; very brittle, and incapable of yielding. Of the cruſtaceous kinds are the lobſter, the crab, and the tortoiſe: of the teſtaceous, that numerous tribe of oyſters, muſcles, cockles, and ſea ſnails, which offer with infinite variety.

THE LOBSTER.] However different in figure the lobſter and the crab may ſeem, their manners and conformation are nearly the ſame. With all the voracious appetites of fiſhes, they are condemned to lead an inſect life at the bottom of the water; and though preſſed by continual hunger, they are often obliged to wait till accident brings them their prey. Though without any warmth in their bodies, or even without red blood circulating through their veins, they are animals wonderfully voracious. Whatever they ſeize upon that has life, is ſure to periſh, though ever ſo well defended: they even devour each other: and, to encreaſe our ſurprize ſtill more, they may, in ſome meaſure, be ſaid to eat themſelves; as they change their ſhell and their ſtomach every year, and their old ſtomach is generally the firſt morſel that ſerves to glut the new.

The *Lobſter* is an animal of ſo extraordinary a form, that thoſe who firſt ſee it are apt to miſtake the head for the tail; but it is ſoon diſcovered that the animal moves with its claws foremoſt; and that the part which plays within itſelf by joints, like a coat of armour, is the tail. The mouth, like that of inſects, opens the long way of the body, not croſs-ways, as with man, and the higher race of animals. It is furniſhed with two teeth in the mouth, for the comminution of its food; but as theſe are not ſufficient, it has three more in the ſtomach; one on each ſide, and the other below. Between the two teeth there is a fleſhy ſubſtance, in the ſhape of a tongue. The inteſtines conſiſt of one long bowel, which reaches from the mouth to the vent; but what this animal differs in from all others, is, that the ſpinal marrow is in the breaſt bone. It is furniſhed with two long feelers or horns, that iſſue on each ſide of the head, that ſeem to correct the dimneſs of its ſight, and apprize the animal of its danger, or of its prey. The tail, or that jointed inſtrument at the other end, is the grand inſtrument of motion; and with this it can raiſe itſelf in the water. Under this we uſually ſee lodged the ſpawn in great abundance; every pea adhering to the next by a very fine filament, which is ſcarcely perceivable. Every lobſter is an hermaphrodite, and is ſuppoſed to be ſelf-impregnated. The ovary, or place where the ſpawn is firſt produced, is backwards, toward the tail, where a red ſubſtance is always found, and which is nothing but a cluſter of peas, that are yet too ſmall for excluſion. From this receptacle there go two canals, that open on each ſide at the jointures of the ſhell, at the belly; and through theſe paſſages the peas deſcend to be excluded, and placed under the tail, where the animal preſerves them from danger for ſome time, until they come to maturity; when, being furniſhed with limbs and motion, they drop off into the water.

When the young lobſters leave the parent, they immediately ſeek for refuge in the ſmalleſt clefts of rocks, and in ſuch like crevices at the bottom of the ſea, where the entrance is but ſmall, and the opening can be eaſily defended. There, without ſeeming to take any food, they grow larger in a few weeks time, from the mere accidental ſubſtances which the water waſhes to their retreats. By this time alſo they acquire an hard, firm ſhell, which furniſhes them with both offenſive and defenſive armour. They then begin to iſſue from their fortreſſes, and boldly creep along the bottom, in hopes of meeting with diminutive plunder. The ſpawn of fiſh, the ſmaller animals of their own kind, but chiefly the worms that keep at the bottom of the ſea, ſupply them with plenty. They keep in this manner cloſe among the rocks, buſily employed in ſcratching up the ſand with their claws for worms, or ſurpriſing ſuch heedleſs animals as fall within their graſp: thus they have little to apprehend, except from each other; for in them, as among fiſhes, the large are the moſt formidable of all enemies to the ſmall.

But this life of abundance and ſecurity is ſoon to have a moſt dangerous interruption; for the body of the lobſter ſtill continuing to encreaſe, while its ſhell remains unalterably the ſame, the animal becomes too large for its habitation, and impriſoned within the cruſt that has naturally gathered round it, there comes on a neceſſity of getting free. The young of this kind, therefore, that grow faſter, as we are aſſured by the fiſhermen, change their ſhell oftener than the old, who come to their full growth, and who remain in the ſame ſhell often for two years together. In general, however, all theſe animals change their ſhell once a year; and this is not only a moſt painful operation, but alſo ſubjects them to every danger. Juſt before caſting its ſhell, it throws itſelf upon its back, ſtrikes its claws againſt each other, and every limb ſeems to tremble; its feelers are agitated, and the whole body is in violent motion: it then ſwells itſelf in an unuſual manner, and at laſt the ſhell is ſeen beginning to divide at its junctures. It alſo ſeems turned inſide out; and its ſtomach comes away with its ſhell. After this, by the ſame operation, it diſengages itſelf of the claws, which burſt at the joints; the animal, with a tremulous motion, caſting them off as a man would kick off a boot that was too big for him.

Thus, in a ſhort time, this wonderful creature finds itſelf at liberty; but in ſo weak and enfeebled a ſtate, that it continues for ſeveral hours motionleſs. Indeed, ſo violent and painful is the operation, that many of them die under it; and thoſe which ſurvive, are in ſuch a weakly ſtate for ſome time, that they neither take food, nor venture from their retreats. Immediately after this change, they have not only the ſoftneſs, but the timidity of a worm. Every animal of the deep is then a powerful enemy, which they can neither eſcape nor oppoſe; and this, in fact, is the time when the dog-fiſh, the cod, and the ray, devour them by hundreds. But this ſtate of defenceleſs imbecility continues for a very ſhort time: the animal, in leſs than two days, is ſeen to have the ſkin that covered its body grown almoſt as hard as before; its appetite is ſeen to increaſe; and, ſtrange to behold! the firſt object that tempts it gluttony, is its own ſtomach, which it ſo lately was diſengaged from. This it devours with great eagerneſs; and, ſome time after, eats even its former ſhell. In about forty-eight hours, in proportion to the animal's health and ſtrength, the new ſhell is perfectly formed, and as hard as that which was but juſt thrown aſide.

When the lobſter is completely equipped in its new ſhell, it then appears how much it has grown in the ſpace of a very few days; the dimenſions of the old ſhell being compared with thoſe of the new, it will be found that the creature is increaſed above a third in its ſize; and, like a boy that has outgrown his clothes, it ſeems wonderful how the deſerted ſhell was able to contain ſo great an animal as entirely fills up the new.

The creature thus furniſhed, not only with a complete covering, but alſo a greater ſhare of ſtrength and courage, ventures more boldly among the animals at the bottom; and not a week paſſes that in its combats it does not ſuffer ſome mutilation. A joint, or even a whole claw is ſometimes ſnapped off in theſe encounters. At certain ſeaſons of the year, theſe animals never meet each other, without an engagement. In theſe, to come off with the loſs of a leg, or even a claw, is conſidered as no great calamity; the victor carries off the ſpoil to feaſt upon at his leiſure, while the other retires from the defeat to wait for a thorough repair. This repair is not long in procuring. From the place where the joint of the claw was cut away, is ſeen, in a moſt ſurpriſing manner, to burgeon out the beginning of a new claw. This, if obſerved, at firſt, is ſmall and tender, but grows, in the ſpace of three weeks, to be almoſt as large and as powerful as the old one. We ſay almoſt as large, for it never arrives to the full ſize; and this is the reaſon we generally find the claws of the lobſters of unequal magnitude.

Of this extraordinary, yet well-known animal, there are many varieties, with ſome differences in the claws, but little in the habits or conformation. It is found above three feet long; and, if we may admit the ſhrimp and the prawn into the claſs, though unfurniſhed with claws it is ſeen not above an inch. Theſe all live in the water, and can bear its abſence for but a few hours. The ſhell is black when taken out of the water, but turns red by boiling. The moſt common way of taking the lobſter is in a baſket, or pot, as the fiſhermen call it, made of wicker-work, in which they put the bait, and then throw it to the bottom of the ſea, in ſix or ten fathom water. The lobſters creep into this for the ſake of the bait, but are not able to get out again. The *river craw-fiſh* differs little from the lobſter, but that the one will live only in freſh-water, and the other will thrive only in the ſea.

The *ſpiny Lobſter* (See pl. XC.) alſo differs merely by the offenſive armour which it bears upon its back and claws.

As the CRAB is found upon land as well as in the water, the peculiarity of its ſituation produces a difference in its habitudes, which it is proper to deſcribe. The *Land-crab* is found in ſome of the warmer regions of Europe, and in great abundance in all the tropical climates in Africa and America. They are of various kinds, and endued with various properties; ſome being healthful, delicious, and nouriſhing food; others, poiſonous or malignant to the laſt degree; ſome are not above half an inch broad, others are found a foot over; ſome are of a dirty brown, and others beautifully mottled. That animal called the *violet crab* of the Caribbee Iſlands, is the moſt noted, both for its ſhape, the delicacy of its fleſh, and the ſingularity of its manners.

The *violet crab* (See pl. XC.) ſomewhat reſembles two hands cut through the middle and joined together; for each ſide looks like four fingers, and the two nippers or claws reſemble the thumbs. All the reſt of the body is covered with a ſhell as large as a man's hand and bunched in the middle, on the fore-part of which there are two long eyes of the ſize of a grain of barley, as tranſparent as cryſtal and as hard as horn. A little below theſe is the mouth, covered with a ſort of barbs, under which there are two broad ſharp teeth as white as ſnow. They are not placed, as in other animals, croſsways, but in the oppoſite direction, not much unlike the blades of a pair of ſciſſars. With theſe teeth they can eaſily cut leaves, fruits, and rotten wood, which is their uſual food. But their principal inſtrument for cutting and ſeizing their food is their nippers, which catch ſuch an hold, that the animal loſes the limb ſooner than its graſp, and is often ſeen ſcampering off, having left its claw ſtill holding faſt upon the enemy. The faithful claw ſeems to perform its duty, and keeps for above a minute faſtened upon the finger while the crab is making off*. In fact it loſes no great matter by leaving a leg or an arm, for they ſoon grow again, and the animal is found as perfect as before.

This, however, is the leaſt ſurpriſing part of this creature's hiſtory: and what we are going to relate, were it not as well known and as confidently confirmed as any other circumſtance in Natural Hiſtory, might well ſtagger our belief. Theſe animals live not only in a kind of ſociety

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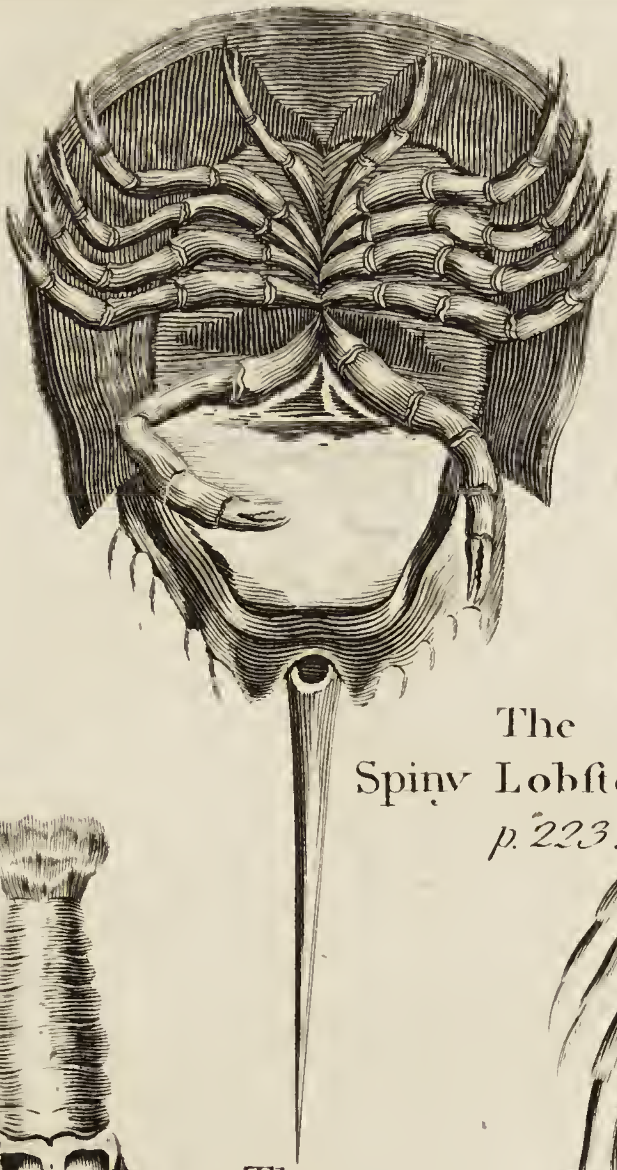
* Brown's Jamaica, p. 423.

Plate.90.

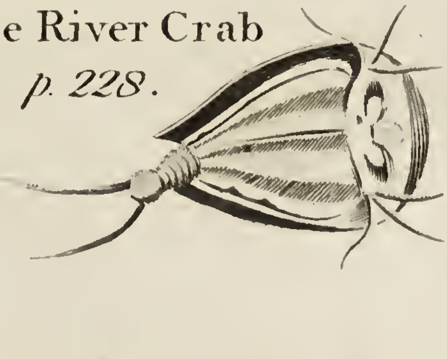


The
Violet Crab
p.224.

The
Spiny Lobſter
p.223.

The
Lobſter Crab
p. 228.

The River Crab
p. 228.



in their retreats in the mountains, but regularly once a year march down to the ſea-ſide in a body of ſome millions at a time. As they multiply in great numbers, they chuſe the months of April or May to begin their expedition; and then ſally out by thouſands from the ſtumps of hollow trees, from the clefts of rocks, and from the holes which they dig for themſelves under the ſurface of the earth. At that time the whole ground is covered with this band of adventurers; there is no ſetting down one's foot without treading upon them. The ſea is the place of deſtination, and to that they direct their march with right-lined preciſion. No geometrician could ſend them to their deſtined ſtation by a ſhorter courſe; they neither turn to the right or left, whatever obſtacles intervene; and even if they meet with a houſe, they will attempt to ſcale the walls to keep the unbroken tenor of their way. But though this be the general order of their route, they upon other occaſions are compelled to conform to the face of the country; and if it be interſected by rivers, they are then ſeen to wind along the courſe of the ſtream. The proceſſion ſets forward from the mountains with the regularity of an army under the guidance of an experienced commander. They are commonly divided into three battalions; of which, the firſt conſiſts of the ſtrongeſt and boldeſt males, that like pioneers, march forward to clear the route and face the greateſt dangers. Theſe are often obliged to halt for want of rain, and go into the moſt convenient encampment till the weather changes. The main body of the army is compoſed of females, which never leave the mountains till the rain is ſet in for ſome time, and then deſcend in regular battalia, being formed into columns of fifty paces broad, and three miles deep, and ſo cloſe that they almoſt cover the ground. Three or four days after this the rear-guard follows; a ſtraggling, undiſciplined tribe, conſiſting of males and females, but neither ſo robuſt nor ſo numerous as the former. The night is their chief time of proceeding; but if it rains by day, they do not fail to profit by the occaſion; and they continue to move forward in their ſlow uniform manner. When the ſun ſhines and is hot upon the ſurface of the ground, they then make an univerſal halt, and wait till the cool of the evening. When they are terrified, they march back in a confuſed diſorderly manner, holding up their nippers, with which they ſometimes tear off a piece of the ſkin, and then leave the weapon where they inflicted the wound. They even try to intimidate their enemies; for they often clatter their nippers together, as if it were to threaten thoſe that come to diſturb them. But though they thus ſtrive to be formidable to man, they are much more ſo to each other; for they are poſſeſſed of one moſt unſocial property, which is, that if any of them by accident is maimed in ſuch a manner as to be incapable of proceeding, the reſt fall upon and devour it on the ſpot, and then purſue their journey.

When after a fatiguing march, and eſcaping a thouſand dangers, for they are ſometimes three months in getting to the ſhore, they have arrived at their deſtined port, they prepare to caſt their ſpawn. The peas are as yet within their bodies, and not excluded, as is uſual in animals of this kind, under the tail; for the creature waits for the benefit of the ſea-water to help the delivery. For this purpoſe, the crab has no ſooner reached the ſhore, than it eagerly goes to the edge of the water, and lets the waves waſh over its body two or three times. This ſeems only a preparation for bringing their ſpawn to maturity; for without farther delay they withdraw to ſeek a lodging upon land: in the mean time, the ſpawn grows larger, is excluded out of the body, and ſticks to the barbs under the flap, or more properly the tail. This bunch is ſeen as big as an hen's egg, and exactly reſembling the roes of herrings. In this ſtate of pregnancy, they once more ſeek the ſhore for the laſt time, and ſhaking off their ſpawn into the water, leave accident to bring it to maturity. At this time whole ſhoals of hungry fiſh are at the ſhore, and about two thirds of the crabs eggs are immediately devoured by theſe rapacious invaders. The eggs that eſcape are hatched under the ſand; and ſoon after millions at a time of theſe little crabs are ſeen quitting the ſhore, and ſlowly travelling up to the mountains.

The old ones, however, are not ſo active to return; they have become ſo feeble and lean, that they can hardly creep along, and the fleſh at that time changes its colour. Moſt of them, therefore, are obliged to continue in the flat parts of the country till they recover, making holes in the earth, which they cover at the mouth with leaves and dirt ſo that no air may enter. There they throw off their old ſhells, which they leave as it were quite whole, the place where they opened on the belly being unſeen. At that time they are quite naked, and almoſt without motion for ſix days together, when they become ſo fat as to be delicious food. They have then under their ſtomachs four large white ſtones, which gradually decreaſe in proportion as the ſhell hardens, and when they come to perfection are not to be found. It is at that time that the animal is ſeen ſlowly making its way back; and all this is moſt commonly performed in the ſpace of ſix weeks.

The deſcent of theſe creatures for ſuch important purpoſes deſerves our admiration; but there is an animal of the lobſter kind that annually deſcends from its mountains in like manner, and for purpoſes ſtill more important and various. Its deſcent is not only to produce an offspring, but to provide itſelf a covering; not only to ſecure a family, but to furniſh an houſe. The animal in queſtion is the *ſoldier-crab*, which has ſome ſimilitude to the lobſter, if diveſted of its ſhell. It is uſually about four inches long, has no ſhell behind, but is covered down to the tail with a rough ſkin, terminating in a point. It is however armed with ſtrong hard nippers before, like the lobſter; and one of them is as thick as a man's thumb, and pinches moſt powerfully. It is, as was ſaid, without a ſhell to any part except its nippers; but what Nature has denied this animal it takes care to ſupply by art; and taking poſſeſſion of the deſerted ſhell of ſome other animal, it reſides in it, till, by growing too large for its habitation, it is under a neceſſity of change. It is a native of the Weſt-India Iſlands; and like the former, it is ſeen every year deſcending from the mountains to the ſea-ſhore, to depoſit its ſpawn, and to provide itſelf with a new ſhell. This is a moſt buſtling time with it, having ſo many things to do: and, in fact, very buſy it appears. It is very probable that its firſt care is to provide for its offspring before it attends to its own wants; and it is thought, from the number of little ſhells which it is ſeen examining, that it depoſits its ſpawn in them, which thus is placed in perfect ſecurity till the time of excluſion.

Yet it is not only till after many trials, but many combats alſo, that the ſoldier is completely equipped; for there is often a conteſt between two of them for ſome well-looking favourite ſhell for which they are rivals. They both endeavour to take poſſeſſion; they ſtrike with their claws; they bite each other, till the weakeſt is obliged to yield, by giving up the object of diſpute. It is then that the victor immediately takes poſſeſſion, and parades in his new conqueſt three or four times back and forward upon the ſtrand before his envious antagoniſt.

When this animal is taken, it ſends forth a feeble cry, endeavouring to ſeize the enemy with his nippers; which if it faſtens upon, it will ſooner die than quit the graſp. The wound is very painful, and not eaſily cured. For this reaſon, and as it is not much eſteemed for its fleſh, it is generally permitted to return to its old retreat to the mountains in ſafety. There it continues till the neceſſity of changing once more, and the deſire of producing an offspring, expoſe it to freſh dangers the year enſuing.

There are many other ſpecies of this animal, ſuch as the *lobſter crab* (See pl. XC.) the *river crab* (See pl. XC.) the *minute crab*, which is found in the inſide of muſcles, &c.

Tortoises are uſually divided into thoſe that live upon land, and thoſe that ſubſiſt in the water; and uſe has made a diſtinction even in the name; the one being called tortoiſes, the other turtles. However, Seba has proved that all tortoiſes are amphibious; that the land tortoiſe will live in the water; and that the ſea turtle can be fed upon land. A land tortoiſe was brought to him that was caught in one of the canals of Amſterdam, which he kept for half a year in his houſe, where it lived very well contented in both elements. When in the water it remained with its head above the ſurface; when placed in the ſun, it ſeemed delighted with its beams, and continued immoveable while it felt their warmth. The difference, therefore, in theſe animals, ariſes rather from their habits than their conformation; and, upon examination, there will be leſs variety found between them than between birds that live upon land, and thoſe that ſwim upon the water.

All tortoiſes, in their external form, much reſemble each other; their outward covering being compoſed of two great ſhells, the one laid upon the other, and only touching at the edges; however, when we come to look cloſer, we ſhall find that the upper ſhell is compoſed of no leſs than thirteen pieces. There are two holes at either edge of this vaulted body; one for a very ſmall head, ſhoulders and arms, to peep through, the other at the oppoſite edge, for the feet and the tail. Theſe ſhells the animal is never diſengaged from; and they ſerve for its defence againſt every creature but man.

The *land tortoiſe* (See pl. LXXXIX.) is generally found, from one to five feet long, from the end of the ſnout to the end of the tail; and from five inches to a foot and an half acroſs the back. It has a ſmall head, ſomewhat reſembling that of a ſerpent: an eye without the upper lid; the under eye-lid ſerving to cover and keep that organ in ſafety. It has a ſtrong, ſcaly tail, like the lizard. Its head the animal can put out and hide at pleaſure, under the great penthouſe of its ſhell: there it can remain ſecure from all attacks. As the tortoiſe lives wholly upon vegetable food, it never ſeeks the encounter; yet, if any of the ſmaller animals attempt to invade its repoſe, they are ſure to ſuffer. The tortoiſe, impregnably defended, is furniſhed with ſuch a ſtrength of jaw, that, though armed only with bony plates inſtead of teeth, wherever it faſtens, it infallibly keeps its hold, until it has taken out the piece.

Though peaceable in itſelf, it is formed for war in another reſpect, for it ſeems almoſt endued with immortality. Nothin can kill it; the depriving it of one of its members, is but a ſlight injury; it will live, though deprived of the brain; it will live, though deprived of its head. Tortoiſes are commonly known to exceed eighty years old; and there was one kept in the Archbiſhop of Canterbury's garden at Lambeth, that was remembered above an hundred and twenty. It was at laſt killed by the ſeverity of the froſt, from which it had not ſufficiently defended itſelf in its winter retreat, which was a heap of ſand, at the bottom of the garden.

Though there is a circulation of blood in the tortoiſe, yet as the lungs are left out of the circulation, the animal is capable of continuing to live without continuing to breathe. In this it reſembles the bat, the ſerpent, the mole, and the lizard; like them it takes up its dark reſidence for the winter; and, at that time, when its food is no longer in plenty, it happily becomes inſenſible to the want. But it muſt not be ſuppoſed that, while it is thus at reſt, it totally diſcontinues to breathe; on the contrary, an animal of this kind, if put into a cloſe veſſel, without air, will ſoon be ſtifled; though not ſo readily as in a ſtate of vigour and activity.

The eggs of all the tortoiſe kind; like thoſe of birds, are furniſhed with a yolk and a white; but the ſhell is different, being ſomewhat like thoſe ſoft eggs that hens exclude before their time: however, this ſhell is much thicker and ſtronger, and is a longer time in coming to maturity in the womb. The land tortoiſe lays but a few in number, if compared to the ſea turtle, who depoſits from an hundred and fifty to two hundred in a ſeaſon.

The amount of the land tortoiſe's eggs we have not been able to learn; but, from the ſcarceneſs of the animal, but am apt to think they cannot be very numerous. When it prepares to lay, the female ſcratches a ſlight depreſſion in the earth, generally in a warm ſituation, where the beams of the ſun have their full effect. There depoſiting her eggs, and covering them with graſs and leaves, ſhe forſakes them, to be hatched by the heat of the ſeaſon. The young tortoiſes are generally excluded in about twenty-ſix days; but, as the heat of the weather aſſiſts, or its coldneſs retards incubation, ſometimes it happens that there is a difference of two or three days. The little animals no ſooner leave the egg, than they ſeek for their proviſion, entirely ſelf-taught: and their ſhell, with which they are covered from the beginning, expands and grows larger with age. As it is compoſed of a variety of pieces, they are all capable of extenſion at their ſutures; and the ſhell admits of encreaſe in every direction.

It is common enough to take theſe animals into gardens, as they are thought to deſtroy inſects and ſnails in great abundance. We are even told, that, in hot countries, they are admitted into a domeſtic ſtate, as they are great deſtroyers of bugs.

The *Sea Tortoiſe*, or *Turtle*, (See pl. LXXXIX.) as it is now called, is generally found larger than the former.

The Great Mediterranean Turtle is the largeſt of the turtle kind with which we are acquainted. It is found from five to eight feet long, and from ſix to nine hundred pounds weight; but, unluckily, its utility bears no proportion to its ſize, as it is unfit for food, and ſometimes poiſons thoſe who eat it. The ſhell alſo, which is a tough, ſtrong integument, reſembling an hide, is unfit for all ſerviceable purpoſes. One of theſe animals was taken in the year 1729, at the mouth of the Loire, in nets that were not deſigned for ſo large a capture. This turtle, which was of enormous ſtrength, by its own ſtruggles, involved itſelf in the nets, in ſuch a manner, as to be incapable of doing miſchief: yet, even thus ſhackled, it appeared terrible to the fiſhermen, who were at firſt for flying; but, finding it impotent, they gathered courage to drag it on ſhore, where it made a moſt horrible bellowing; and when they began to knock it on the head with their gaffs, it was to be heard at half a mile's diſtance. They were ſtill further intimidated by its nauſeous and peſtilential breath, which ſo powerfully affected them, that they were near fainting. This animal wanted but four inches of being eight feet long, and was about two feet over; its ſhell more reſembled leather than the ſhell of a tortoiſe; and, unlike all other animals of this kind, it was furniſhed with teeth in each jaw, one rank behind another, like thoſe of a ſhark; its feet alſo, different from the reſt of this kind, wanted claws; and the tail was quite diſengaged from the ſhell, and fifteen inches long, more reſembling that of a quadruped, than a tortoiſe.

Theſe are a formidable and uſeleſs kind, if compared to the turtle caught in the South Seas and the Indian Ocean. Theſe are of different kinds; not only unlike each other in form, but furniſhing man with very different advantages. They are uſually diſtinguiſhed by ſailors into four kinds; the Trunk Turtle, the Loggerhead, the Hawkſbill, and the Green Turtle.

The Hawkſbill Turtle is the leaſt of the four, and has a long and ſmall mouth, ſomewhat reſembling the bill of an hawk. The fleſh of this alſo is very indifferent eating; but the ſhell ſerves for the moſt valuable purpoſes. This is the animal that ſupplies the tortoiſe-ſhell, of which ſuch a variety of beautiful trinkets are made.

But of all animals of the tortoiſe kind, the green turtle is the moſt noted, and the moſt valuable, from the delicacy of its fleſh, and its nutritive qualities, together with the property of being eaſily digeſted. It is generally found about two hundred weight; though ſome are five hundred, and others not above fifty.

This animal ſeldom comes from the ſea but to depoſit its eggs. Its chief food conſiſts of the mangrove, the blackwood tree, and other marine plants. When the weather is fair, the turtles are ſometimes ſeen feeding in great numbers, like flocks of ſheep, ſeveral fathoms deep upon the verdant carpet below. They frequent the creeks and ſhallows where they are uſually taken; but they are extremely ſhy of boats and men, and ſwim remarkably faſt.

When the time for laying approaches, the female is ſeen, towards the ſetting of the ſun, drawing near the ſhore, and looking earneſtly about her, as if afraid of being diſcovered. When ſhe perceives any perſon on ſhore, ſhe ſeeks for another place; but if otherwiſe, ſhe lands when it is dark, and goes to take a ſurvey of the ſand where ſhe deſigns to lay. Having marked the ſpot, ſhe goes back without laying, for that night, to the ocean again; but the next night returns to depoſit a part of her burthen. She begins by working and digging in the ſand with her fore feet, till ſhe has made a round hole, a foot broad, and a foot and a half deep, juſt at the place a little above where the water reaches higheſt. This done, ſhe lays eighty or ninety eggs at a time, each as big as a pigeon's egg. The eggs are covered with a tough, white ſkin, like wetted parchment. When ſhe has done laying, ſhe covers the hole ſo dexterouſly, that it is no eaſy matter to find the place. When the turtle has done laying, ſhe returns to the ſea, and leaves her eggs to be hatched by the heat of the ſun. At the end of fifteen days, ſhe lays about the ſame number of eggs again; and at the end of another fifteen days, ſhe repeats the ſame; three times in all, uſing the ſame precautions every time for their ſafety.

In about twenty-four or twenty-five days after laying, the eggs are hatched by the heat of the ſun; and the young turtles, being about as big as quails, are ſeen burſting from the ſand, as if earth-born, and running directly to the ſea, with inſtinct only for their guide; but, to their great misfortune, it often happens that, their ſtrength being ſmall, the ſurges of the ſea, for ſome few days, beat them back upon the ſhore. Thus expoſed, they remain a prey to thouſands of birds that then haunt the coaſts; and theſe ſtooping down upon them, carry off the greateſt part, and ſometimes the whole brood, before they have ſtrength ſufficient to withſtand the waves or dive to the bottom. They are generally caught in two ways, by nets, and by what is called pegging. The peg is of iron, and ſomething larger than a ten-penny nail, and without a barb; to this is affixed an iron ſocket, in which is inſerted a long pole, and the peg is held by a tolerably ſtrong line. When the turtle is ſtruck, the hunter diſengages the pole, and draws the turtle to the boat by the line.

There is yet another way which, though ſeemingly awkward, is ſaid to be attended with very great ſucceſs. A good diver places himſelf at the head of the boat; and when the turtles are obſerved, which they ſometimes are in great numbers, aſleep on the ſurface, he immediately quits the veſſel at about fifty yards diſtance, and keeping ſtill under water, directs his paſſage to where the turtle was ſeen, and coming up beneath, ſeizes it by the hind-fin;

hind-fin; the animal awaking, ſtruggles to get free; and by this both are kept at the ſurface until the boat arrives to take them in.

The ſhell of TESTACEOUS FISHES may be conſidered as an habitation ſupplied by nature. It is an hard ſtony ſubſtance, made up ſomewhat in the manner of a wall. Part of the ſtony ſubſtance the animal derives from outward objects, and the fluids of the animal itſelf furniſh the cement. Theſe united make that firm covering which ſhell-fiſh generally reſide in till they die.

But, in order to give a more exact idea of the manner in which ſea-ſhells are formed, we muſt have recourſe to an animal that lives upon land, with the formation of whoſe ſhell we are beſt acquainted. This is the garden-ſnail, that carries its box upon its back.

To begin with the animal in its earlieſt ſtate, and trace the progreſs of its ſhell from the time it firſt appears—The inſtant the young ſnail leaves the egg, it carries its ſhell or its box on its back. It does not leave the egg till it is arrived at a certain growth, when its little habitation is ſufficiently hardened. This beginning of the ſhell is not much bigger than a pin's head, but grows in a very rapid manner, having at firſt but two circumvolutions, for the reſt are added as the ſnail grows larger. In proportion as the animal encreaſes in ſize, the circumvolutions of the ſhell encreaſe alſo, until the number of thoſe volutes come to be five, which is never exceeded.

The part where the animal enlarges its ſhell is at the mouth, to which it adds in proportion as it finds itſelf ſtinted in its habitation below. Being about to enlarge its ſhell, it is ſeen with its little teeth biting and clearing away the ſcaly ſkin that grows at the edges. It is ſometimes ſeen to eat thoſe bits it thus takes off; and at other times it only cleans away the margin when covered with films, and then adds another rim to its ſhell.

For the purpoſes of making the ſhell, which is natural to the animal, and without which it could not live three days, its whole body is furniſhed with glands, from the orifices of which flows out a kind of ſlimy fluid, like ſmall ſpiders threads, which join together in one common cruſt or ſurface, and in time condenſe and acquire a ſtony hardneſs. It is this ſlimy humour that grows into a membrane and afterwards a ſtony ſkin, nor can it have eſcaped any who have obſerved the track of a ſnail; that gliſtening ſubſtance which it leaves on the floor or the wall is no other than the materials with which the animal adds to its ſhell, or repairs it when broken.

With reſpect to the figure of ſhells, Ariſtotle has divided them into three kinds; and his method is, above all others, the moſt conformable to nature. Theſe are, firſt, the univalve, or *turbinated*, which conſiſt of one piece, like the box of a ſnail; ſecondly, the *bivalve*, conſiſting of two pieces, united by a hinge, like an oyſter; and thirdly, the *multivalve*, conſiſting of more than two pieces, as the acorn-ſhell, which has not leſs than twelve pieces that go to its compoſition. All theſe kinds are found in the ſea at different depths; and are valuable in proportion to their ſcarceneſs or beauty. All ſhells are formed of an animal or calcareous earth, that ferments with vinegar and other acids, and that burns into lime, and will not eaſily melt into glaſs.

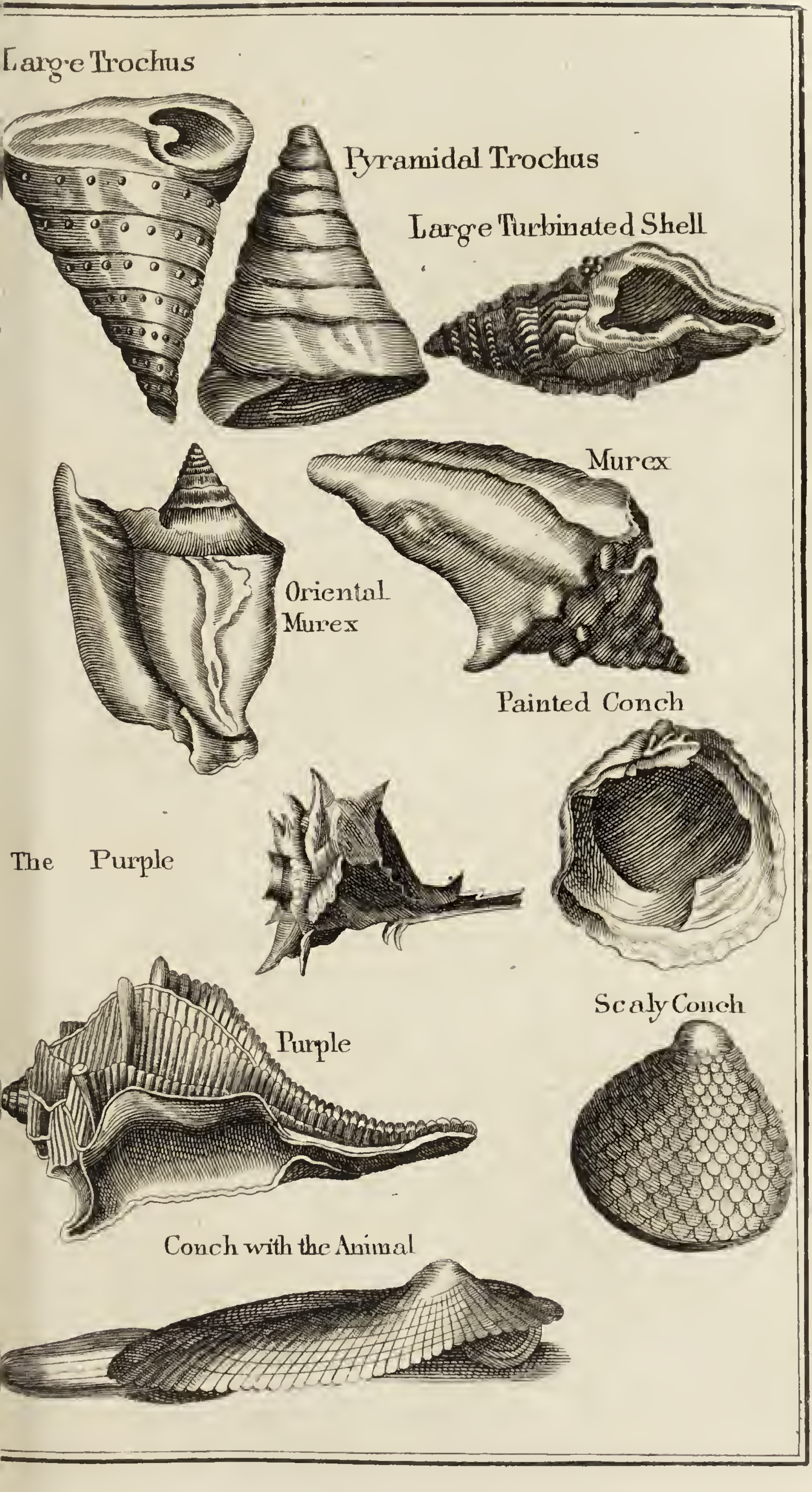
Every ſhell, wherever it is found, is the ſpoil of ſome animal, that once found ſhelter therein. It matters not by what unaccountable means they may have wandered from the ſea; but they exhibit all, and the moſt certain marks of their origin. From their numbers and ſituation, we are led to conjecture, that the ſea reached the places where they are found; and from their varieties we learn how little we know of all the ſea contains at preſent; as the earth furniſhes many kinds which our moſt exact and induſtrious ſhell-collectors have not been able to fiſh up from the deep.

Univalve or Turbinated Shell-fiſh. (See pl. XCI.)

To conceive the manner in which thoſe animals ſubſiſt that are hid from us at the bottom of the deep, we muſt again have recourſe to one of a ſimilar nature and formation, that we know, viz. the GARDEN-SNAIL. It is furniſhed with the organs of life in a manner almoſt as complete as the largeſt animal; with a tongue, brain, ſalival ducts, glands, nerves, ſtomach, and inteſtines, liver, heart and blood-veſſels: beſides this, it has a purple bag that furniſhes a red matter to different parts of the body, together with ſtrong muſcles that hold it to the ſhell, and which are hardened, like tendons, at their inſertion.

But theſe it poſſeſſes in common with other animals. We muſt now ſee what it has peculiar to itſelf. The firſt ſtriking peculiarity is, that the animal has got its eyes on the

Plate 91. Univalve Shells *p.234.*



the points of its largeſt horns. When the ſnail is in motion, four horns are diſtinctly ſeen; but the two uppermoſt and longeſt deſerve peculiar conſideration, both on account of the various motions with which they are endued, as well as their having their eyes fixed at the extreme ends of them. The eyes the animal can direct to different objects at pleaſure, by a regular motion out of the body; and ſometimes it hides them, by a very ſwift contraction into the belly. Under the ſmall horns is the animal's mouth; and though it may appear too ſoft a ſubſtance to be furniſhed with teeth, yet it has not leſs than eight of them, with which it devours leaves, and other ſubſtances, ſeemingly harder than itſelf; and with which it ſometimes bites off pieces of its own ſhell.

At the expiration of eighteen days after coition, the ſnails produce their eggs, and hide them in the earth with the greateſt ſolicitude and induſtry. Theſe eggs are in great numbers, round, white, and covered with a ſoft ſhell: they are alſo ſtuck to each other by an imperceptible ſlime; like a bunch of grapes, of about the ſize of a ſmall pea.

The ſnail is poſſeſſed not only of a power of retreating into its ſhell, but of mending it when broken. Sometimes theſe animals are cruſhed ſeemingly to pieces; and to all appearance utterly deſtroyed; yet ſtill they ſet themſelves to work, and, in a few days, mend all their numerous breaches. The ſame ſubſtance by which the ſhell is originally made, goes to the re-eſtabliſhment of the ruined habitation.

As the ſnail is furniſhed with all the organs of life and ſenſation, it is not wonderful to ſee it very voracious. It chiefly ſubſiſts upon the leaves of plants and trees; but is very delicate in its choice. At the approach of winter, it buries itſelf in the earth, or retires to ſome hole, to continue in a torpid ſtate, during the ſeverity of the ſeaſon. It is ſometimes ſeen alone; but more frequently in company in its retreat; ſeveral being uſually found together, apparently deprived of life and ſenſation. For the purpoſes of continuing in greater warmth and ſecurity, the ſnail forms a cover or lid to the mouth of its ſhell with its ſlime, which ſtops it up entirely, and thus protects it from every external danger. When the cover is formed too thick, the ſnail then breaks a little hole in it, which corrects the effect of that cloſeneſs, which proceeded from too much caution. In this manner, ſheltered in its hole from the weather, defended in its ſhell by a cover, it ſleeps during the winter; and, for ſix or ſeven months, continues without food or motion, until the genial call of ſpring breaks its ſlumber, and excites its activity.

The ſnail, having ſlept for ſo long a ſeaſon, awakes one of the firſt fine days of April; breaks open its cell, and ſallies forth to ſeek for nouriſhment. At firſt, it is not very difficult in the choice of its food; almoſt any vegetable that is green ſeems welcome; but the ſucculent plants of the garden are chiefly grateful; and the various kinds of pulſe are, at ſome ſeaſons, almoſt wholly deſtroyed by their numbers. A wet ſeaſon is generally favourable to their production; for this animal cannot bear very dry ſeaſons, or dry places, as they cauſe too great a conſumption of its ſlime, without plenty of which it cannot ſubſiſt in health and vigour.

Such are the moſt ſtriking particulars in the hiſtory of this animal; and this may ſerve as a general picture, to which the manners and habitudes of the other tribes of this claſs may be compared and referred. Theſe are, the ſea ſnail, of which naturaliſts have, from the apparent difference of their ſhells, mentioned fifteen kinds *; the freſh water ſnail, of which there are eight kinds; and the land-ſnail, of which there are five: and theſe all bear a ſtrong reſemblance to the garden ſnail. ALL SNAILS THAT LIVE IN WATER, are peculiarly furniſhed with a contrivance by Nature, for riſing to the ſurface, or ſinking to the bottom. The manner in which this is performed, is by opening and ſhutting an orifice on the right ſide of the neck, which is furniſhed with muſcles for that purpoſe. The ſnail ſometimes gathers this aperture into an oblong tube, and ſtretches or protends it above the ſurface of the water, in order to draw in or expel the air, as it finds occaſion. This may not only be ſeen, but heard alſo by the noiſe which the ſnail makes in moving the water. By dilating this it riſes; by compreſſing it, the animal ſinks to the bottom.

But what renders theſe animals far more worthy of notice is, that they are viviparous, and bring forth their young not only alive, but with their ſhells upon their backs. This ſeems ſurpriſing; yet it is inconteſtably true: the young come to ſome degree of perfection in the womb of the parent; there they receive their ſtony coat; and

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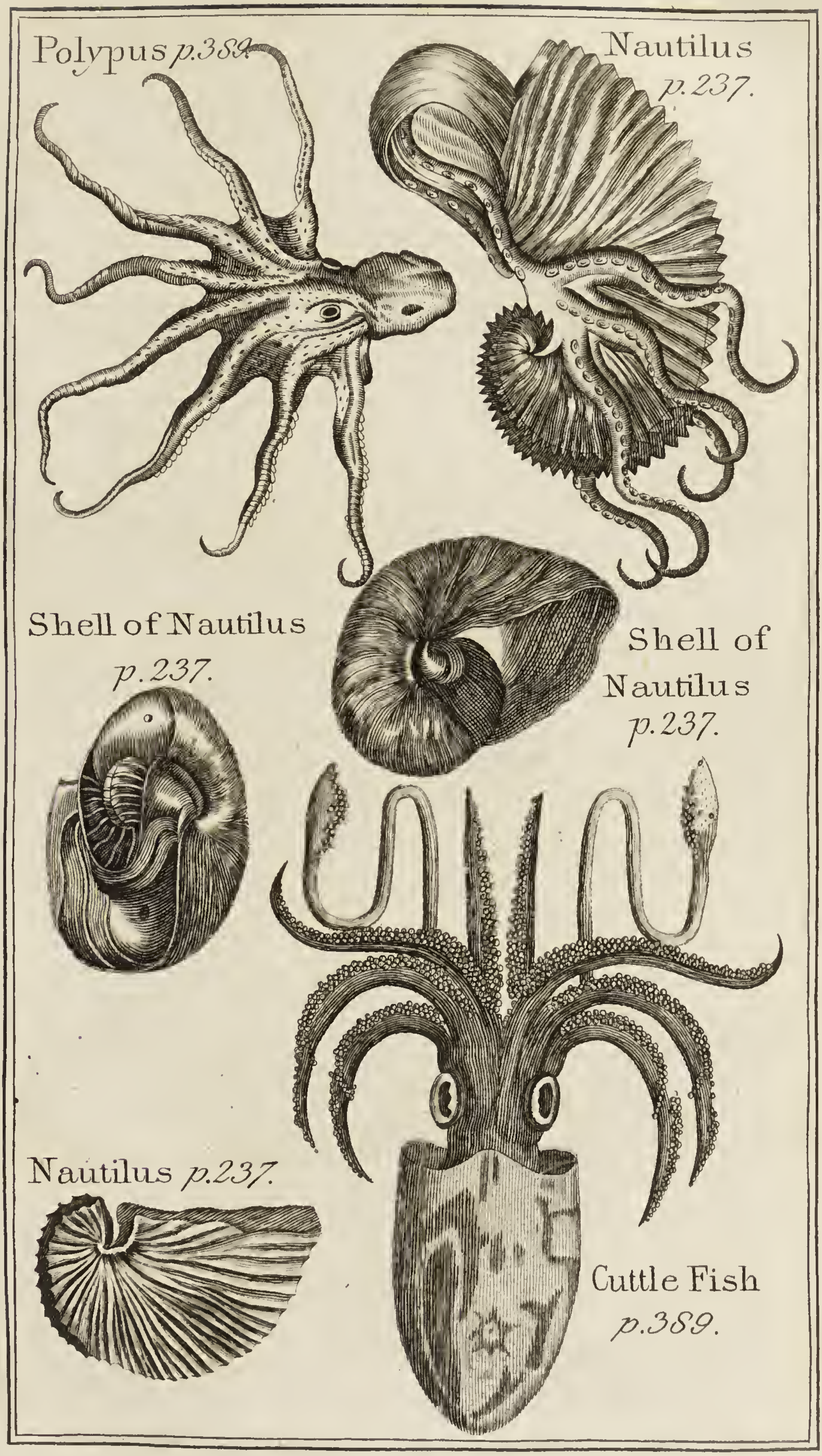
* D'Argenville's Conchylioligie.

Plate.92.


Polypus *p.389.*
Nautilus *p.237.*
Shell of Nautilus *p.237.*
Shell of Nautilus *p.237.*
Nautilus *p.237.*
Cuttle Fish *p.389.*

thence are excluded, with a complete apparatus for ſubſiſtence.

This ſtriking difference between the freſh-water and the garden ſnail, obtains alſo in ſome of the SEA KIND; among which there are ſome that are found viviparous, while others lay eggs in the uſual manner. But this is not the only difference between land and ſea ſnails. Many of the latter entirely want horns; and none of them have above two. Indeed, if the horns of ſnails be furniſhed with eyes, and if, as ſome are willing to think, the length of the horn, like the tube of a teleſcope, aſſiſts viſion, theſe animals, that chiefly reſide in the gloomy bottom of the deep, can have no great occaſion for them. Eyes would be unneceſſary to creatures whoſe food is uſually concealed in the darkeſt places; and who, poſſeſſed of very little motion, are obliged to grope for what they ſubſiſt on. To ſuch, eyes would rather be an obſtruction than an advantage; and perhaps even thoſe that live upon land are without them!

There is a difference alſo in the poſition of the mouth, in the garden and the water ſnail. In the former, the mouth is placed croſs-wiſe, as in quadrupeds; furniſhed with jaw-bones, lips, and teeth. In moſt of the ſea-ſnails, the mouth is placed longitudinally in the head; and, in ſome, obliquely, or on one ſide. Others, of the trochus kind, have no mouth whatſoever; but are furniſhed with a trunk, very long in ſome kinds, and ſhorter in others.

Of all ſea ſnails, that which is moſt frequently ſeen ſwimming upon the ſurface, and whoſe ſhell is the thinneſt and moſt eaſily pierced, is the NAUTILUS (See pl. XCII.) whether, upon theſe occaſions, it is employed in eſcaping its numerous enemies at the bottom, or ſeeking for food at the ſurface, we will not venture to decide. It ſeems moſt probable, that the former is the cauſe of its frequently appearing; for, upon opening the ſtomach, it is found to contain chiefly that food which it finds at the bottom.

Although there are ſeveral ſpecies of the nautilus, yet they all may be divided into two: the one with a white ſhell, as thin as paper, which it often is ſeen to quit, and again to reſume; the other with a thicker ſhell, ſometimes of a beautiful mother-of-pearl colour, and that quits its ſhell but rarely. This ſhell outwardly reſembles that of a large ſnail, but is generally ſix or eight inches acroſs:

within, it is divided into forty partitions, that communicate with each other by doors, if we may ſo call them, through which one could not thruſt a gooſe-quill: almoſt the whole internal part of the ſhell is filled by the animal, the body of which, like its habitation, is divided into as many parts as there are chambers in its ſhell: all the parts of its body communicate with each other, through the doors or openings, by a long blood-veſſel, which runs from the head to the tail: thus the body of the animal, if taken out of the ſhell, may be likened to a number of ſoft bits of fleſh, of which there are forty threaded upon a ſtring. From this extraordinary conformation, one would not be apt to ſuppoſe that the nautilus ſometimes quitted its ſhell, and returned to it again; yet nothing, though ſeemingly impoſſible, is more certain. The manner by which it contrives to diſengage every part of its body from ſo intricate an habitation; by which it makes a ſubſtance, to appearance, as thick as ones wriſt, paſs through forty doors, each of which would ſcarcely admit a gooſe quill, is not yet diſcovered: but the fact is certain; for the animal is often found without its ſhell; and the ſhell more frequently deſtitute of the animal. It is moſt probable, that it has a power of making the ſubſtance of one ſection of its body remove up into that which is next; and thus, by multiplied removals, it gets free.

But this, though very ſtrange, is not the peculiarity for which the nautilus has been the moſt diſtinguiſhed. Its ſpreading the thin oar, and catching the flying gale, to uſe the poet's deſcription of it, has chiefly excited human curioſity. Theſe animals, particularly thoſe of the white, light kind, are chiefly found in the Mediterranean; and ſcarce any who have ſailed on that ſea, but muſt have often ſeen them. When the ſea is calm, they are obſerved floating on the ſurface; ſome ſpreading their little ſail; ſome rowing with their feet, as if for life and death; and others ſtill, floating upon their mouths, like a ſhip with the keel upward. If taken while thus employed, and examined, the extraordinary mechaniſm, of their limbs for ſailing will appear more manifeſt. The nautilus is furniſhed with eight feet, which iſſue near the mouth, and may as properly be called barbs: theſe are connected to each other by a thin ſkin, like that between the toes of a duck, but much thinner, and more tranſparent. Of theſe eight feet thus connected, ſix are ſhort, and theſe are held up as ſails to catch the wind in ſailing: the two others are longer, and are kept in the water; ſerving, like paddles, to ſteer their courſe by. When the weather is quite calm, and the animal is purſued from below, it is then ſeen expanding only a part of its ſail, and rowing with the reſt: whenever it is interrupted, or fears danger from above, it inſtantly furls the ſail, catches in all its oars, turns its ſhell mouth downward, and inſtantly ſinks to the bottom. Sometimes alſo it is ſeen pumping the water from its leaking hulk; and, when unfit for ſailing deſerts its ſhell entirely. The forſaken hulk is ſeen floating along, till it daſhes, by a kind of ſhipwreck, upon the rocks or the ſhore.

It may ſeem whimſical to make a diſtinction between the animal perfections of turbinated and *Bivalved Shell-fiſh*, or to grant a degree of ſuperiority to the ſnail above the oyſter. Yet this diſtinction ſtrongly and apparently obtains in nature; and we ſhall find the bivalved tribe of animals in every reſpect inferior to thoſe we have been deſcribing.

THE MUSCLE, as is well known, whether belonging to freſh or ſalt water, conſiſts of two equal ſhells, joined at the back by a ſtrong muſcular ligament that anſwers all the purpoſes of an hinge. By the elaſtic contraction of this, the animal can open its ſhells at pleaſure, about a quarter of an inch from each other. The fiſh is fixed to either ſhell by four tendons, by means of which it ſhuts them cloſe, and keeps its body firm from being cruſhed by any ſhock againſt the walls of its own habitation. It is furniſhed, like all other animals of this kind, with vital organs, though theſe are ſituated in a very extraordinary manner. It has a mouth furniſhed with two fleſhy lips; its inteſtine begins at the bottom of the mouth, paſſes through the brain, and makes a number of circumvolutions through the liver; on leaving this organ, it goes on ſtraight into the heart, which it penetrates, and ends in the anus; near which the lungs are placed, and through which it breathes, like thoſe of the ſnail kind; and in this manner its languid circulation is carried on.

The multitude of theſe animals in ſome places is very great; but from their defenceleſs ſtate, the number of their deſtroyers are in equal proportion.

But notwithſtanding the number of this creature's animated enemies, it ſeems ſtill more fearful of the agitations of the element in which it reſides; for if daſhed againſt rocks, or thrown far on the beach, it is deſtroyed without a power of redreſs. In order to guard againſt theſe, which are to this animal the commoneſt and the moſt fatal accidents, although it has a power of ſlow motion, which we ſhall preſently deſcribe, yet it endeavours to become ſtationary, and to attach itſelf to any fixed object it happens to be near. For this purpoſe it is furniſhed with a very ſingular capacity of binding itſelf by a number of threads to whatever object it approaches; and theſe Reaumur ſuppoſed it ſpun artificially, as ſpiders their webs, which they faſten againſt a wall. Of this, however, later philoſophers have found very great reaſon to doubt. It is therefore ſuppoſed that theſe threads, which are uſually called the beard of the muſcle, are the natural growth of the animal's body, and by no means produced at pleaſure.

Its inſtrument of motion, by which it contrives to reach the object it wants to bind itſelf to, is that muſcular ſubſtance reſembling a tongue, which is found long in proportion to the ſize of the muſcle. In ſome it is two inches long, in others not a third part of theſe dimenſions. This the animal has a power of thruſting out of its ſhell; and with this it is capable of making a ſlight furrow in the ſand at the bottom. By means of this furrow it can erect itſelf upon the edge of its ſhell; and thus continuing to make the furrow in proportion as it goes forward, it reaches out its tongue, that anſwers the purpoſe of an arm, and thus carries its ſhell edge-ways, as in a groove, until it reach the point intended. There where it determines to take up its reſidence it fixes the ends of its beard, which are glutinous, to the rock or the object, whatever it be; and thus, like a ſhip at anchor, braves all the agitations of the water. The beards have bee ſeen a foot and an half long; and of this ubſtance the natives of Palermo ſometimes make gloves and ſtockings.

Theſe ſhell-fiſh are found in lakes, rivers, and in the ſea. Thoſe of the lake often grow to a very large ſize; but they ſeem a ſolitary animal, and are found generally ſeparate from each other. Thoſe of rivers are not ſo large, but yet in greater abundance; but the ſea muſcle is in moſt plenty. Theſe are often bred artificially in ſalt-water marſhes that are overflowed by the tide; the fiſhermen throwing them in at the proper ſeaſons; and there being undiſturbed by the agitations of the ſea, and not preyed upon by their powerful enemies at the bottom, they caſt their eggs, which ſoon become perfect animals, and theſe are generally found in cluſters of ſeveral dozen together. It requires a year for the peopling a muſcle-bed; ſo that, if the number conſiſts of forty thouſand, a tenth part may annually be left for the peopling the bed anew. Muſcles are taken from their beds from the month of July to October; and they are ſold at a very moderate price.

From this animal the OYSTER differs very little, except in the thickneſs of its ſhell, and its greater imbecility. The oyſter, like the muſcle, is formed with organs of life and reſpiration, with inteſtines which are very voluminous, a liver, lungs, and heart. Like the muſcle, it is ſelf-impregnated; and the ſhell, which the animal ſoon acquires, ſerves it for its future habitation. Like the muſcle, it opens its ſhell to receive the influx of water, and like that animal, is ſtrongly attached to its ſhells both above and below.

The oyſter differs from the muſcle in being utterly unable to change its ſituation. It is entirely without that tongue which we ſaw anſwering the purpoſes of an arm in the other animal; but nevertheleſs is often attached very firmly to any object it happens to approach. Nothing is ſo common in the rivers of the tropical climates as to ſee oyſters growing even amidſt the branches of the foreſt. Many trees, which grow along the banks of the ſtream, often bend their branches into the water, and particularly the mangrove, which chiefly delights in a moiſt ſituation. To theſe the oyſters hang in cluſters, like apples upon the moſt fertile tree; and in proportion as the weight of the fiſh ſinks the plant into the water, where it ſtill continues growing, the number of oyſters encreaſe, and hang upon the branches. This is effected by means of a glue proper to themſelves, which, when it cements, the joining is as hard as the ſhell, and is as difficultly broken.

Oyſters uſually caſt their ſpawn in May, which at firſt appears like drops of candle-greaſe, and ſticks to any hard ſubſtance it falls upon. Theſe are covered with a ſhell in two or three days; and in three years the animal is large enough to be brought to market. As they invariably remain in the places where they are laid, and as they grow without any other ſeeming food than the afflux of ſea-water, it is the cuſtom at Colcheſter, and other parts of England, where the tide ſettles in marſhes on land, to pick up great quantities of ſmall oyſters along the ſhore, which when firſt gathered, ſeldom exceed the ſize of a ſixpence. Theſe are depoſited in beds where the tide comes in, and in two or three years grow to a tolerable ſize. They are ſaid to be better taſted for being thus ſheltered from the agitations of the deep; and a mixture of freſh water entering into theſe repoſitories, is ſaid to improve their flavour, and to increaſe their growth and fatneſs.

The oyſters, however, which are prepared in this manner, are by no means ſo large as thoſe found ſticking to rocks at the bottom of the ſea, uſually called rock-oyſters. Theſe are ſometimes found as broad as a plate, and are admired by ſome as excellent food. But what is the ſize of theſe compared to the oyſters of the Eaſt Indies, ſome of whoſe ſhells we have ſeen two feet over! The oyſters found along the coaſt of Coromandel are capable of furniſhing a plentiful meal to eight or ten men; but it ſeems univerſally agreed that they are no way comparable to ours for delicacy or flavour.

Thus the muſcle and the oyſter appear to have but few diſtinctions, except in their ſhape, and the power of motion in the former. Other bivalved ſhell-fiſh, ſuch as the COCKLE, the SCALLOP, and the RAZOR-ſhell, have differences equally minute. The power of changing place, which ſome of them effect in a manner quite peculiar to themſelves, makes their greateſt difference.

The *ſcallop* is particularly remarkable for its method of moving forward upon land, or ſwimming upon the ſurface of the water. When this animal finds itſelf deſerted by the tide, it makes very remarkable efforts to regain the water, moving towards the ſea in a moſt ſingular manner. It firſt gapes with its ſhell as widely as it can, the edges being often an inch aſunder; then it ſhuts them with a jerk, and by this the whole animal riſes five or ſix inches from the ground. It thus tumbles any way forward, and then renews the operation until it has attained its journey's end. When in the water it is capable of ſupporting itſelf upon the ſurface; and there opening and ſhutting its ſhells, it tumbles over and over, and makes its way with ſome celerity.

The Pivot, or *Razor-Shell* has a very different kind of motion. As the former moves laboriouſly and ſlowly forward, ſo the razor-ſhell has only a power of ſinking point downward. The ſhells of this animal reſemble nothing ſo much as the haft of a razor; and by this form it is better enabled to dive into the ſoft ſand at the bottom. All the motions of this little animal are confined to ſinking or riſing a foot downwards or upwards in the ſand, for it never leaves the ſpot where firſt it was planted. From time to time it is ſeen to riſe about half way out of its hole; but, if any way diſturbed, it ſinks perpendicularly down again. Juſt over the place where the razor buries itſelf, there is a ſmall hole like a chimney, through which the animal breathes, or imbibes the ſea-water. Upon the deſertion of the tide, theſe holes are eaſily diſtinguiſhed by the fiſhermen who ſeek for it; and their method of enticing the razor up from the depth of its retreat, is, by ſprinkling a little ſea-ſalt upon the hole. This melting, no ſooner reaches the razor below, than it riſes inſtantly ſtraight upwards, and ſhews about half its length above the ſurface. This appearance, however, is inſtantaneous; and, if the fiſher does not ſeize the opportunity, the razor buries itſelf, with great eaſe, to its former depth. There it continues ſecure; no ſalt can allure it a ſecond time; but it remains unmoleſted, unleſs the fiſher will be at the trouble of digging it out ſometimes two feet below the ſurface.

Such are the minute differences between bivalved ſhell-fiſh; but in the great outlines of their nature, they exactly reſemble each other. It is particularly in this claſs of ſhell-fiſh that pearls are found in greateſt abundance. The pearl ſeems bred from no diſorder in the animal, but accidentally produced by the ſame matter that goes to form the ſhell. This ſubſtance, which is ſoft at firſt, quickly hardens; and thus, by ſucceſſive coats, layer over layer, the pearl acquires its dimenſions. If cut through, it will be found to conſiſt of ſeveral coats, like an onion; and ſometimes a ſmall ſpeck is ſeen in the middle, upon which the coats were originally formed.

All oyſters, and moſt ſhell-fiſh, are found to contain pearls; but that which particularly obtains the name of the pearl oyſter, has a large ſtrong whitiſh ſhell, wrinkled and rough without, and within ſmooth, and of a ſilver colour. From theſe the mother-of-pearl is taken, which is nothing more than the internal coats of the ſhell, reſembling the pearl in colour and conſiſtence. There are a great number of pearl fiſheries in America and Aſia. The chief of theſe is carried on in the Perſian Gulph.

The wretched people that are deſtined to fiſh for pearls, are either Negroes, or ſome of the pooreſt of the natives of Perſia. The divers are not only ſubject to the dangers of the deep, to tempeſts, to ſuffocation at the bottom, to being devoured by ſharks, but from their profeſſion univerſally labour under a ſpitting of blood, occaſioned by the preſſure of air upon their lungs in going down to the bottom. The moſt robuſt and healthy young men are choſen for this employment, but they ſeldom ſurvive it above five or ſix years. Their fibres become rigid; their eye-balls turn red; and they uſually die conſumptive.

It is amazing how very long they are ſeen to continue at the bottom. Some, as we are aſſured, have been known to continue three quarters of an hour under water without breathing; and to one unuſed to diving, ten minutes would ſuffocate the ſtrongeſt. They fiſh for pearls, or rather the oyſters that contain them, in boats twenty-eight feet long; and of theſe there are ſometimes three or four hundred at a time, with each ſeven or eight ſtones, which ſerve for anchors. There are from five to eight divers belonging to each, that dive one after another. They are quite naked, except that they have a net hanging down from the neck to put their oyſters in, and gloves on their hands to defend them while they pick the oyſters from the holes in the rocks; for in this manner alone can they be gathered. Every diver is ſunk by means of a ſtone, weighing fifty pounds, tied to the rope by which he deſcends. He places his foot in a kind of ſtirrup, and laying hold of the rope with his left hand, with his right he ſtops his noſe to keep in his breath, as upon going down he takes in a very long inſpiration. They are no ſooner come to the bottom, but they give the ſignal to thoſe who are in the boat to draw up the ſtone; which done, they go to work, filling their net as faſt as they can; and then giving another ſignal, the boats above pull up the net loaded with oyſters, and ſhortly after the diver himſelf, to take a new inſpiration. They dive to the depth of fifteen fathoms, and ſeldom go deeper. They generally go every morning by break of day to this fatiguing employment, taking the land-wind to waft them out to ſea, and returning with the ſea-breeze at night. The owners of the boats uſually hire the divers, and the reſt of the boat's crew, as we do our labourers, at ſo much a day. All the oyſters are brought on ſhore, where they are laid in a great heap till the pearl fiſhery is over, which continues during the months of November and December. When opportunity ſerves, they then examine every oyſter, and it is accidental whether the capture turns out advantageous. Indeed, no human being can wiſh well to a commerce, which thus chains ſuch a number of fellow-creatures to the bottom, to pluck up a glittering mouldering pebble.

Multivalve Shell-fiſh may be conſidered as animals ſhut up in round boxes. Of theſe there are principally two kinds; ſuch as move, and ſuch as are ſtationary: the firſt are uſually known in our cabinets by the name of ſea-eggs; the others are as often admired, from the cavities which they ſcoop out for their habitation in the hardeſt marble. The firſt are called, by naturaliſts, Echini, or Urchins: the latter are called Pholades, or File Fiſh.

To a ſlight view, the SEA-URCHIN (See pl. XCIV.) may be compared to the huſk of a cheſnut; being, like it, round, and with a number of bony prickles ſtanding out on every ſide. The mouth is placed downwards; the vent is above; the ſhell is a hollow vaſe, reſembling a ſcooped apple; and this filled with a ſoft, muſcular ſubſtance, through which the inteſtines wind from the bottom to the top. The mouth, which is placed undermoſt, is large and red, furniſhed with five ſharp teeth, which are eaſily diſcerned. The jaws are ſtrengthened by five ſmall bones, in the centre of which is a ſmall fleſhy tongue; and from this the inteſtines make a winding of five ſpires, round the internal ſides of the ſhell, ending at top, where the excrements are excluded. But what makes the moſt extraordinary part of this animal's conformation, are its horns and its ſpines, that point from every part of the body, like the horns of a ſnail, and that ſerve at once as legs to move upon, as arms to feel with, and as inſtruments of capture and defence. Between theſe horns it has alſo ſpines, that are not endued with ſuch a ſhare of motion. The ſpines and the horns iſſue from every part of its body; the ſpines being hard and prickly; the horns being ſoft, longer than the ſpines, and never ſeen except in the water. They are put forward and withdrawn like the horns of a ſnail, and are hid at the baſis of the ſpines, ſerving, as was ſaid before, for procuring food and motion. All this apparatus, however, is only ſeen when the animal is hunting its prey at the bottom of the water; for a few minutes after it is taken, all the horns are withdrawn into the body, and moſt of the ſpines drop off.

It is generally ſaid of inſects, that thoſe which have the greateſt number of legs, always move the ſloweſt: but this animal ſeems to be an exception to the rule; for though furniſhed with two thouſand ſpines, and twelve hundred horns, all ſerving for legs, and from their number ſeeming to impede each other's motion, yet it runs with ſome ſhare of ſwiftneſs at the bottom, and it is ſometimes no eaſy matter to overtake it. It is often taken upon the ebb, by following it in ſhallow water, either in an ozier baſket, or ſimply with the hand. Both the ſpines and the horns aſſiſt its motion; and the animal is uſually ſeen running with the mouth downward.

Some kinds of this animal are as good eating as the lobſter; and its eggs, which are of a deep red, are conſidered as a very great delicacy. But of others the taſte is but indifferent; and, in all places, except the Mediterranean, they are little ſought for, except as objects of curioſity.

Very different in motion, though not much different in ſhape from theſe, are the ACORN ſhell-fiſh, the THUMB-FOOTED ſhell-fiſh, and the IMAGINARY BARNACLE. Theſe are fixed to one ſpot, and appear to vegetate from a ſtalk. Indeed, to an inattentive ſpectator, each actually ſeems to be a kind of fungus that grows in the deep, deſtitute of animal life as well as motion. But the enquirer will ſoon change his opinion, when he comes to obſerve this muſhroom-like figure more minutely. He will then ſee that the animal reſiding within the ſhell has not only life, but ſome degree of voraciouſneſs. They are ſeen adhering to every ſubſtance that is to be met with in the ocean; rocks, roots of trees, ſhips bottoms, whales, lobſters, and even crabs; like bunches of grapes, clung to each other. It is amuſing enough to behold their operations *. They for ſome time remain motionleſs within their ſhell; but when the ſea is calm, they are ſeen opening the lid, and peeping about them. They then thruſt out their long neck, look round them for ſome time, and then

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* Anderſon's Hiſtory of Greenland.

abruptly retreat back into their box, ſhut their lid, and lurk in darkneſs and ſecurity. Some people eat them; but they are in no great repute at the tables of the luxurious, where their deformed figure would be no objection to their being introduced.

Of all animals of the ſhelly tribe, the PHOLADES are the moſt wonderful. Theſe animals are found in different places; ſometimes clothed in their proper ſhell, at the bottom of the water; ſometimes concealed in lumps of marly earth; and ſometimes lodged, ſhell and all, in the body of the hardeſt marble. In their proper ſhell they aſſume different figures; but, in general, they ſomewhat reſemble a muſcle, except that their ſhell is found actually compoſed of five or more pieces, the ſmaller valves ſerving to cloſe up the openings left by the irregular meeting of the two principal ſhells. But their penetration into rocks, and their reſidence there, makes up the moſt wonderful part of their hiſtory.

This animal, when diveſted of its ſhell, reſembles a roundiſh, ſoft pudding, with no inſtrument that ſeems in the leaſt fitted for boring into ſtones, or even penetrating the ſofteſt ſubſtance. It is furniſhed with two teeth indeed; but theſe are placed in ſuch a ſituation, as to be incapable of touching the hollow ſurface of its ſtony dwelling: it has alſo two covers to its ſhell, that open and ſhut at either end; but theſe are totally unſerviceable to it as a miner. The inſtrument with which it performs all its operations, and buries itſelf in the hardeſt rocks, is only a broad fleſhy ſubſtance, ſomewhat reſembling a tongue, that is ſeen iſſuing from the bottom of its ſhell. With this ſoft, yielding inſtrument, it perforates the moſt ſolid marbles; and having, while yet little and young, made its way, by a very narrow entrance into the ſubſtance of the ſtone, it then begins to grow bigger, and thus to enlarge its apartment.

When it has buried its body in a ſtone, it there continues for life at its eaſe; the ſea-water that enters at the little aperture ſupplying it with luxurious plenty. When the animal has taken too great a quantity of water, it is ſeen to ſpurt it out of its hole with ſome violence. Upon this ſeemingly thin diet, it quickly grows larger, and ſoon finds itſelf under a neceſſity of enlarging its habitation and its ſhell. The motion of the pholas is ſlow beyond conception; its progreſs keeps pace with the growth of its body;

and, in proportion as it becomes larger, it makes its way farther into the rock. When it has got a certain way in, it then turns from its former direction, and hollows downward; till, at laſt, when its habitation is completed, the whole apartment reſembles the bole of a tobacco-pipe; the hole in the ſhank being that by which the animal entered.

But they are not ſupplied only with their rocky habitation; they have alſo a ſhell to protect them: this ſhell grows upon them in the body of the rock, and ſeems a very unneceſſary addition to their defence, which they have procured themſelves by art. Theſe ſhells take different forms, and are often compoſed of a different number of valves; ſometimes ſix; ſometimes but three; ſometimes the ſhell reſembles a tube with holes at either end, one for the mouth, and the other for voiding the excrements.

This animal is found in greateſt numbers at Ancona, in Italy; it is found along the ſhores of Normandy and Poitou, in France; it is found alſo upon ſome of the coaſts of Scotland: and, in general, is conſidered as a very great delicacy, at the tables of the luxurious.

CHAP. XXXIII.

Of Reptiles—The FROG—*The Toad—Varieties—Surinam Toad—Of* LIZARDS—*The Crocodile and Alligator.—The open-bellied Crocodile—The Salamander—The Cordyle, &c.—The Iguana—The Cameleon—The Dragon—The Siren—The Tarantula—The Chalcidian Lizard.*

IF we emerge from the deep, the firſt and moſt obvious claſs of amphibious animals that occur upon land are frogs and toads.

To deſcribe the form of animals ſo well known would be ſuperfluous; to mark thoſe differences that diſtinguiſh them from each other may be neceſſary. The frog moves by leaping; the toad crawls along the ground: the frog is in general leſs than the toad; its colour is brighter, and with a more poliſhed ſurface: the toad is brown, rough, and duſty. The frog is light and active, and its belly comparatively ſmall; the toad is ſlow, ſwollen, and incapable of eſcaping. The frog, when taken, contracts itſelf ſo as to have a lump on its back; the toad's back is ſtraight and even. Their habitudes and manners exhibit a greater variety, and require a ſeparate deſcription.

The external figure of the Frog is too well known to need a deſcription. Its power of taking large leaps is remarkably great, compared to the bulk of its body: and it is the beſt ſwimmer of all four-footed animals.

If we examine this animal internally, we ſhall find that it has very little brain for its ſize; a very wide ſwallow; a ſtomach ſeemingly ſmall, but capable of great diſtenſion. The heart in the frog, as in all other animals that are truly amphibious, has but one ventricle; ſo that the blood can circulate without the aſſiſtance of the lungs, while it keeps under water. The lungs reſemble a number of ſmall bladders joined together, like the cells of a honey-comb: they are connected to the back by muſcles, and can be diſtended or exhauſted at the animal's pleaſure. Neither male nor female have any of the external inſtruments of generation; the anus ſerving for that purpoſe in both. Such are the moſt ſtriking peculiarities in the anatomy of a frog; and in theſe it agrees with the toad, the lizard, and the ſerpent.

The female is impregnated neither by the mouth, as ſome philoſophers imagine, nor by the excreſcence at the thumbs, as was the opinion of Linnæus, but by the inſperſion of the male ſeminal fluid upon the eggs as they proceed from the body.

A ſingle female produces from ſix to eleven hundred eggs at a time; and, in general, ſhe throws them all out together by a ſingle effort; though ſometimes ſhe is an hour in performing this taſk.

When the ſpawn is emitted and impregnated by the male, it drops to the bottom. The eggs, which during the four firſt hours ſuffer no perceptible change, begin then to enlarge and grow lighter; by which means they mount to the ſurface of the water. The twenty-firſt day the egg is ſeen to open a little on one ſide, and the beginning of a tail to peep out, which becomes more and more diſtinct every day. The thirty-ninth day the little animal begins to have motion; it moves at intervals its tail; and it is perceived that the liquor in which it is circumfuſed, ſerves it for nouriſhment. In two days more, ſome of theſe little creatures fall to the bottom; while others remain ſwimming in the fluid round them, while their vivacity and motion is ſeen to encreaſe. Thoſe which fall to the bottom remain there the whole

whole day; but having lengthened themſelves a little, for hitherto they are doubled up, they mount, at intervals, to the mucus, which they had quitted, and are ſeen to feed upon it with great vivacity. The next day they acquire their tadpole form. In three days more they are perceived to have two little fringes, that ſerve as fins beneath the head; and theſe in four days after aſſume a more perfect form. It is then alſo that they are ſeen to feed very greedily upon the pond-weed. When ninety-two days old, two ſmall feet are ſeen beginning to burgeon near the tail; and the head appears to be ſeparate from the body. In five days after this, they refuſe all vegetable food; their mouth appears furniſhed with teeth; and their hinder legs are completely formed. In two days more, the arms are completely produced. In this ſtate it continues for about ſix or eight hours; and then the tail dropping off by degrees, the animal appears in its moſt perfect form.

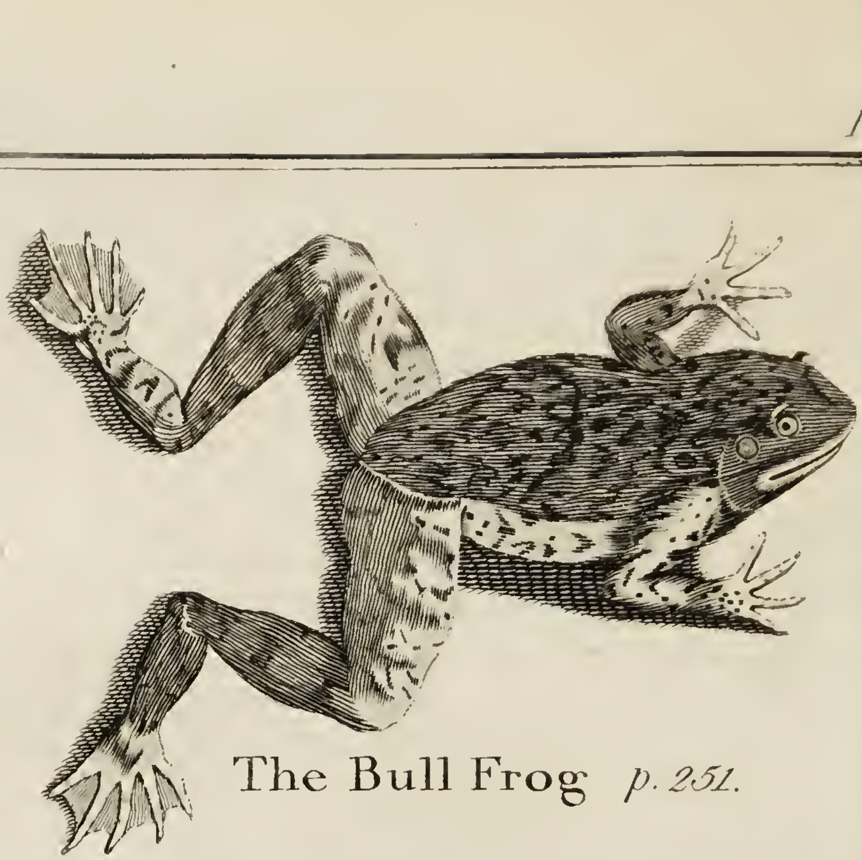
Thus the frog, in leſs than a day, having changed its figure, is ſeen to change its appetites alſo. As ſoon as the animal acquires its perfect ſtate, from having fed upon vegetables it becomes carnivorous, and lives entirely upon worms and inſects. But, as the water cannot ſupply theſe, it is obliged to quit its native element, and ſeek for food upon land, where it lives by hunting worms and taking inſects by ſurprize.

The frog lives for the moſt part out of the water; but when the cold nights begin to ſet in, it returns to its native element, always chuſing ſtagnant waters, where it can lie without danger concealed at the bottom. In this manner it continues torpid, or with but very little motion, all the winter: like the reſt of the dormant race, it requires no food; and the circulation is ſlowly carried on without any aſſiſtance from the air.

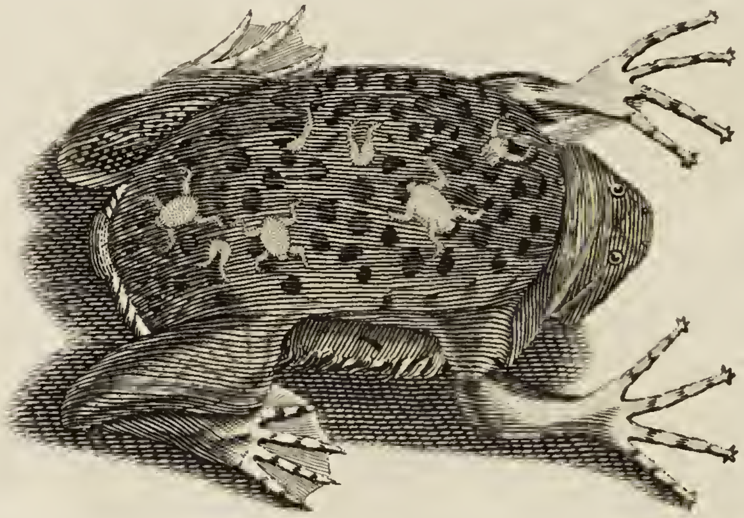
The difference of ſexes, which was mentioned above, is not perceivable in theſe animals, until they have arrived at their fourth year; nor do they begin to propagate, till they have completed that period. By comparing their ſlow growth with their other habitudes, it would appear, that they live about twelve years; but having ſo many enemies, both by land and water, it is probable that few of them arrive at the end of their term.

Frogs live upon inſects of all kinds; but they never eat any, unleſs they have motion. They continue fixed and immoveable till their prey appears; and juſt when it comes ſuf-

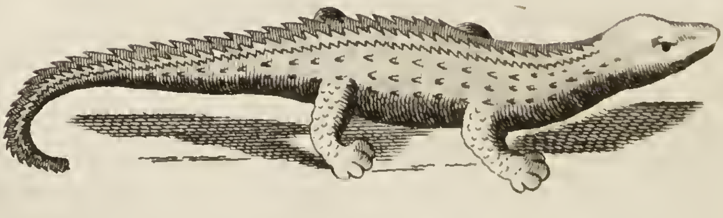
Plate



The Bull Frog *p. 251.*



The Surinam Toad *p. 255.*



Tarantula Lizard *p. 265.*

ſufficiently near, they jump forward with great agility, dart out their tongues, and ſeize it with certainty. The tongue in this animal, as in the toad, lizard, and ſerpent, is extremely long, and formed in ſuch a manner that it ſwallows the point down its throat; ſo that a length of tongue is thus drawn out, like a ſword from its ſcabbard, to aſſail its prey. This tongue is furniſhed with a glutinous ſubſtance; and whatever inſect it touches, infallibly adheres, and is thus held faſt till it is drawn into the mouth.

The croaking of frogs is well known; whence in ſome countries, they are diſtinguiſhed by the ludicrous title of Dutch Nightingales. The large water, or *bull frogs*, of the northern countries (See pl. XCIII.) have a note as loud as the bellowing of a bull; and, for this purpoſe puff up the cheeks to a ſurpriſing magnitude. Of all frogs, however, the male only croaks; the female is ſilent; before wet weather, their voices are in full exertion; they are then heard with unceaſing aſſiduity, ſending forth their call, and welcoming the approaches of their favourite moiſture. No weather-glaſs was ever ſo true as a frog in foretelling an approaching change. This may probably ſerve to explain an opinion which ſome entertain, that there is a month in the year, called Paddock Moon, in which the frogs never croak: the whole ſeems to be no more than that, in the hot ſeaſon, when the moiſture is dried away, and conſequently when theſe animals neither enjoy the quantity of health nor food that at other times they are ſupplied with, they ſhew, by their ſilence, how much they are diſpleaſed with the weather.

As frogs adhere cloſely to the backs of their own ſpecies, ſo it has been found, by repeated experience, they will alſo adhere to the backs of fiſhes. Few that have ponds, but know that theſe animals will ſtick to the backs of carp, and fix their fingers in the corner of each eye. In this manner they are often caught together; the carp blinded and waſted away.

The *Toad*. If we regard the figure of the toad, there ſeems nothing in it that ſhould diſguſt, more than that of the frog. Its form and proportions are nearly the ſame; and it chiefly differs in colour, which is blacker; and its ſlow and heavy motion, which exhibits nothing of the agility of the frog: yet ſuch is the force of habit, begun in early prejudice, that thoſe who conſider the one as an harmleſs, playful animal, turn from the other with horror and diſguſt. The frog is conſidered as a uſeful aſſiſtant, in ridding our grounds of vermin ; the toad, as a ſecret enemy, that only wants an opportunity to infect us with its venom.

As the toad bears a general reſemblance in figure to the frog, ſo alſo it reſembles that animal in its nature and appetites. When like the frog, theſe animals have undergone all the variations of their tadpole ſtate, they forſake the water, and are often ſeen, in a moiſt ſummer's evening, crawling up, by myriads, from fenny places, into drier ſituations. There, having found out a retreat, or having dug themſelves one with their mouth and hands, they lead a patient, ſolitary life, ſeldom venturing out, except when the moiſture of a ſummer's evening invites them abroad. At that time the graſs is filled with ſnails, and the pathways covered with worms, which make their principal food. Inſects alſo, of every kind, they are fond of; and we have the authority of Linnæus for it, that they ſometimes continue immovable, with the mouth open, at the bottom of ſhrubs, where the butterflies, in ſome meaſure faſcinated, are ſeen to fly down their throats.

In a letter from Mr. Arſcott, there are ſome curious particulars relating to this animal, which throw great light upon its hiſtory. " Concerning the toad," ſays he, " that " lived ſo many years with us, and was ſo great a favourite, " the greateſt curioſity was its becoming ſo remarkably " tame : it had frequented ſome ſteps before our hall door " ſome years before my acquaintance commenced with it, " and had been admired by my father for its ſize (being the " largeſt I ever met with) who conſtantly paid it a viſit " every evening. I knew it myſelf above thirty years; and " by conſtantly feeding it, brought it to be ſo tame, that it " always came to the candle and looked up, as if expecting " to be taken up and brought upon the table, where I al" ways fed it with inſects of all ſorts. It was fondeſt of " fleſh maggots, which I kept in bran; it would follow " them, and when within a proper diſtance, would fix his " eyes, and remain motionleſs, for near a quarter of a " minute, as if preparing for the ſtroke, which was an " inſtantaneous throwing of its tongue at a great diſtance " upon the inſect, which ſtuck to the tip by a glutinous " matter. The motion is quicker than the eye can fol" low. I cannot ſay how long my father had been ac" quainted with the toad, before I knew it; but when " I was firſt acquainted with it, he uſed to mention it as

“ the old toad I have known ſo many years. I can anſwer for thirty-ſix years. This old toad made its appearance as ſoon as the warm weather came; and I always concluded it retired to ſome dry bank, to repoſe till ſpring. When we new laid the ſteps, I had two holes made in the third ſtep, on each ſide with a hollow of more than a yard long for it; in which I imagine it ſlept, as it came thence at its firſt appearance. It was ſeldom provoked. Neither that toad, nor the multitudes I have ſeen tormented with great cruelty, ever ſhewed the leaſt deſire of revenge, by ſpitting or emitting any juice from their pimples. Sometimes, upon taking it up, it would let out a great quantity of clear water, which, as I have often ſeen it do the ſame upon the ſteps when quite quiet, was certainly its urine, and no more than a natural evacuation. Spiders, millepedes, and fleſh maggots, ſeem to be this animal's favourite food. I imagine if a bee was to be put before a toad, it would certainly eat it to its coſt*; but as bees are ſeldom ſtirring at the ſame time that toads are, they rarely come in their way; as they do not appear after ſun-riſing, or before ſun-ſet. In the heat of the day they will come to the mouth of their hole, I believe for air. I once, from my parlour window, obſerved a large toad I had in the bank of a bowling-green, about twelve at noon, a very hot day, very buſy and active upon the graſs. So uncommon an appearance made me go out to ſee what it was; when I found an innumerable ſwarm of winged ants had dropped round his hole; which temptation was as irreſiſtible as a turtle would be to a luxurious alderman. In reſpect to its end, had it not been for a tame raven, I make no doubt but it would have been now living. This bird, one day ſeeing it at the mouth of its hole, pulled it out, and, although I reſcued it, pulled out one eye, and hurt it ſo, that, notwithſtanding its living a twelvemonth, it never enjoyed itſelf, and had a difficulty of taking its food, miſſing the mark for want of its eye. Before that accident, it had all the appearance of perfect health.”

The toad, contrary to vulgar prejudice, is an harmleſs, defenceleſs creature, torpid and unvenomous, and ſeeking the darkeſt retreats, not from the malignity of its nature, but the multitude of its enemies.

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* Ræſel tried a frog; it ſwallowed the bee alive; its ſtomach was ſtung, and the animal vomited it up again.

Like all of the frog kind, the toad is torpid in winter. It chuſes then for a retreat either the hollow root of a tree, the cleft of a rock, or ſometimes the bottom of a pond, where it is found in a ſtate of ſeeming inſenſibility. As it is very long-lived, it is very difficult to be killed; its ſkin is tough, and cannot be eaſily pierced; and, though covered with wounds, the animal continues to ſhew ſigns of life, and every part appears in motion. But what ſhall we ſay to its living for centuries lodged in the boſom of a rock, or caſed within the body of an oak tree, without the ſmalleſt acceſs on any ſide, either for nouriſhment or air, and yet taken out alive and perfect! Stories of this kind it would be as raſh to contradict as difficult to believe; we have the higheſt authorities bearing witneſs to their truth, and yet the whole analogy of nature ſeems to arraign them of falſehood. Bacon aſſerts, that toads are found in this manner; Dr. Plot aſſerts the ſame; there is, to this day, a marble chimney-piece at Chatſworth with the print of the toad upon it, and a tradition of the manner in which it was found. In the Memoirs of the Academy of Sciences, there is an account of a toad found alive and healthy in the heart of a very thick elm, without the ſmalleſt entrance or egreſs *. In the year 1731, there was another found near Nants, in the heart of an old oak, without the ſmalleſt iſſue to its cell; and the diſcoverer was of opinion, from the ſize of the tree, that the animal could not have been confined there leſs than eighty or a hundred years, without ſuſtenance, and without air.

Of this animal there are ſeveral varieties; ſuch as the water and the land toad, which probably differ only in the ground-colour of their ſkin. In the firſt, it is more inclining to aſh colour, with brown ſpots; in the other, the colour is brown, approaching to black. The water-toad is not ſo large as the other; but both equally breed in that element. The ſize of the toad with us is generally from two to four inches long; but, in the fenny countries of Europe, they are ſeen much larger; and not leſs than a common crab. But this is nothing to what they are found in ſome of the tropical climates, where travellers

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* Vide the Year 1719.

often, for the firſt time, miſtake a toad for a tortoiſe. Their uſual ſize is from ſix to ſeven inches; but there are ſome ſtill larger, and as broad as a plate. Of theſe, ſome are beautifully ſtreaked and coloured; ſome ſtudded over, as if with pearls; others briſtled with horns or ſpines; ſome have the head diſtinct from the body, while others have it ſo ſunk in, that the animal appears without a head. With us the opinion of its raining toads and frogs, has long been juſtly exploded; but it ſtill is entertained in the tropical countries, and that not only by the ſavage natives, but the more refined ſettlers, who are apt enough to add the prejudices of other nations to their own.

It would be a tedious, as well as a uſeleſs taſk, to enter into all the minute diſcriminations of theſe animals, as found in different countries or places; but the *Pipal* or the *Surinam Toad* (See pl. XCIII.) is too ſtrange a creature, not to require an exact deſcription.

This animal is in form more hideous than even the common toad. The body is flat and broad; the head ſmall; the jaws, like thoſe of a mole, are extended, and evidently formed for rooting in the ground; the ſkin of the neck forms a ſort of wrinkled collar: the colour of the head is of a dark cheſnut, and the eyes are ſmall: the back, which is very broad, is of a lightiſh grey, and ſeems covered over with a number of ſmall eyes, which are round, and placed at nearly equal diſtances. Theſe eyes are very different from what they ſeem; they are the animal's eggs covered with their ſhells, and placed there for hatching. Theſe eggs are buried deep in the ſkin, and in the beginning of geſtation but juſt appear; and are very viſible when the young animal is about to burſt from its confinement. They are of a reddiſh, ſhining yellow colour; and the ſpaces between them are full of ſmall warts, reſembling pearls.

In this manner the pipal is ſeen travelling with her wondrous family on her back, in all the different ſtages of maturity. Some of the ſtrange progeny, not yet come to ſufficient perfection, appear quite torpid, and as yet without life in the egg: others ſeem juſt beginning to riſe through the ſkin; here peeping forth from the ſhell, and there, having entirely forſaken their priſon: ſome are ſporting at large upon their parent's back; and others deſcending to the ground, to try their own fortune below.

Of Lizards.] It is no eaſy matter to tell to what claſs in nature lizards are chiefly allied. They are unjuſtly raiſed to the rank of beaſts, as they bring forth eggs, diſpenſe with breathing, and are not covered with hair. They cannot be placed among fiſhes, as the majority of them live upon land: they are excluded from the ſerpent tribe, by their feet, upon which they run with ſome celerity; and from the inſects, by their ſize; for though the newt may be looked upon in this contemptible light, a crocodile would be a terrible inſect indeed.

As lizards thus differ from every other claſs of animals, they alſo differ widely from each other. With reſpect to ſize, no claſs of beings has its ranks ſo oppoſite.

The colour of theſe animals alſo is very various, as they are found of a hundred different hues, green, blue, red, cheſnut, yellow, ſpotted, ſtreaked, and marbled. Were colour alone capable of conſtituting beauty, the lizard would often pleaſe; but there is ſomething ſo repreſſing in the animal's figure, that the brilliancy of its ſcales, or the variety of its ſpots, only tend to give an air of more exquiſite venom, of greater malignity. The figure of theſe animals is not leſs various; ſometimes ſwollen in the belly; ſometimes purſed up at the throat; ſometimes with a rough ſet of ſpines on the back, like the teeth of a ſaw; ſometimes with teeth, at others with none; ſometimes venomous, at others harmleſs, and even philanthropic: ſometimes ſmooth and even: ſometimes with a long, ſlender tail; and often with a ſhorter blunt one.

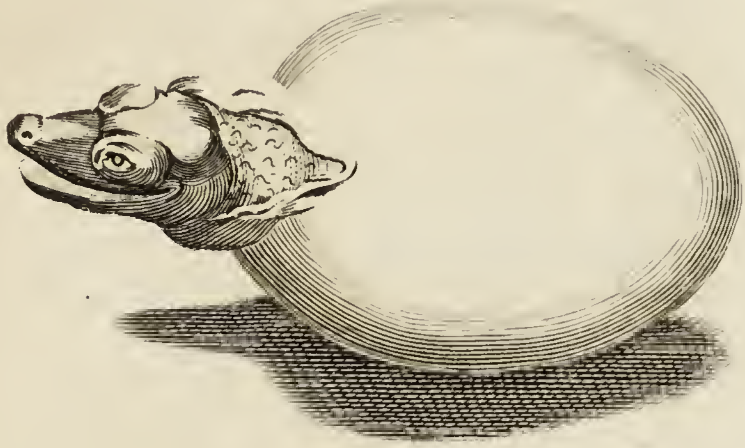
But their greateſt diſtinction ariſes from their manner of bringing forth their young: ſome of them are viviparous; ſome are oviparous; and ſome bring forth ſmall ſpawn, like fiſhes.

The only animals of this genus which are common in Great Britain, are the *Scaly Lizard* (See pl. XCVI.) which is about ſix inches in length; the *Brown Lizard*, or *Eſt*, which is about three inches long; and the *Warty Lizard*, or Salamander, of which we ſhall preſently treat more at large.

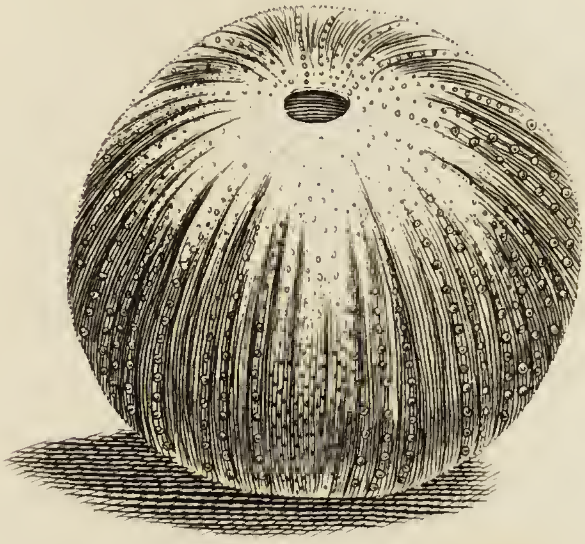
The *Crocodile* (See pl. XCIV. and XCV.) is an animal placed at a happy diſtance from the inhabitants of Europe, and formidable only in thoſe regions where men are ſcarce, and arts are but little known. In all the cultivated and populous parts of the world, the great animals are entirely baniſhed, or rarely ſeen. The appearance of ſuch raiſes at once a whole country up in arms to oppoſe their

force;

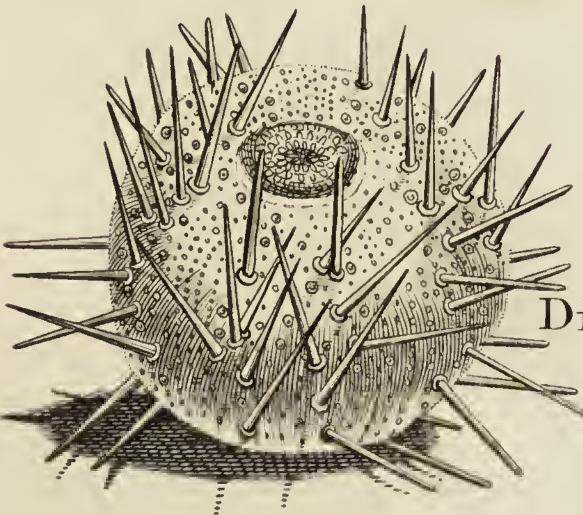
Plate.94.



The Crocodiles Egg *p. 256.*

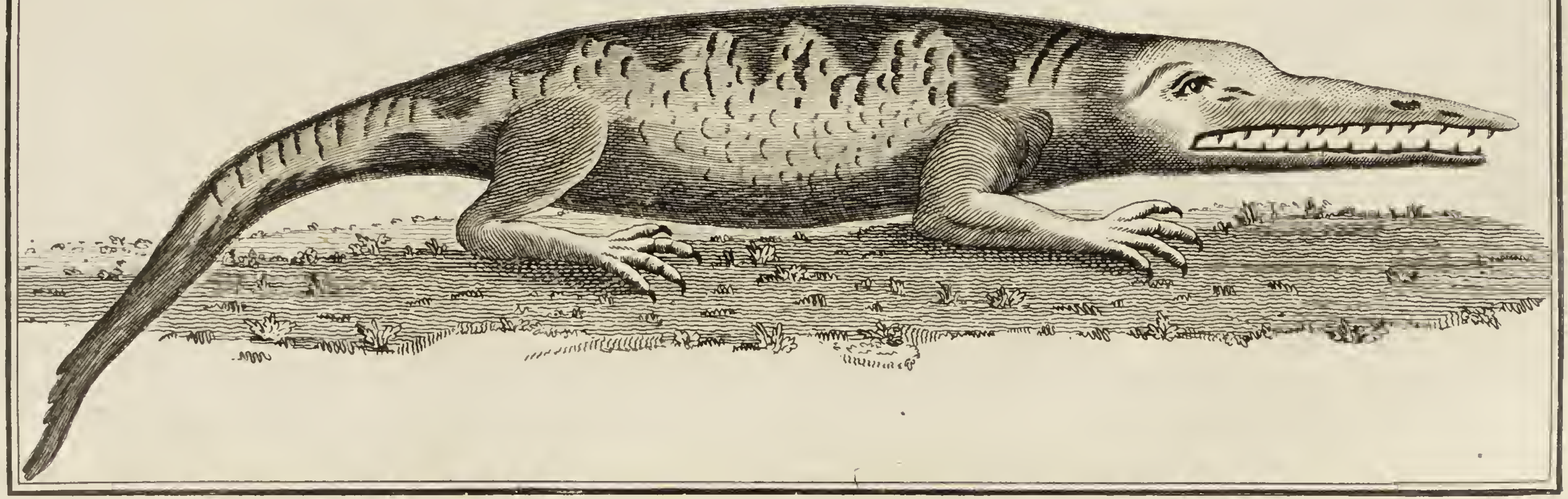


The Sea Urchin *p. 245.*



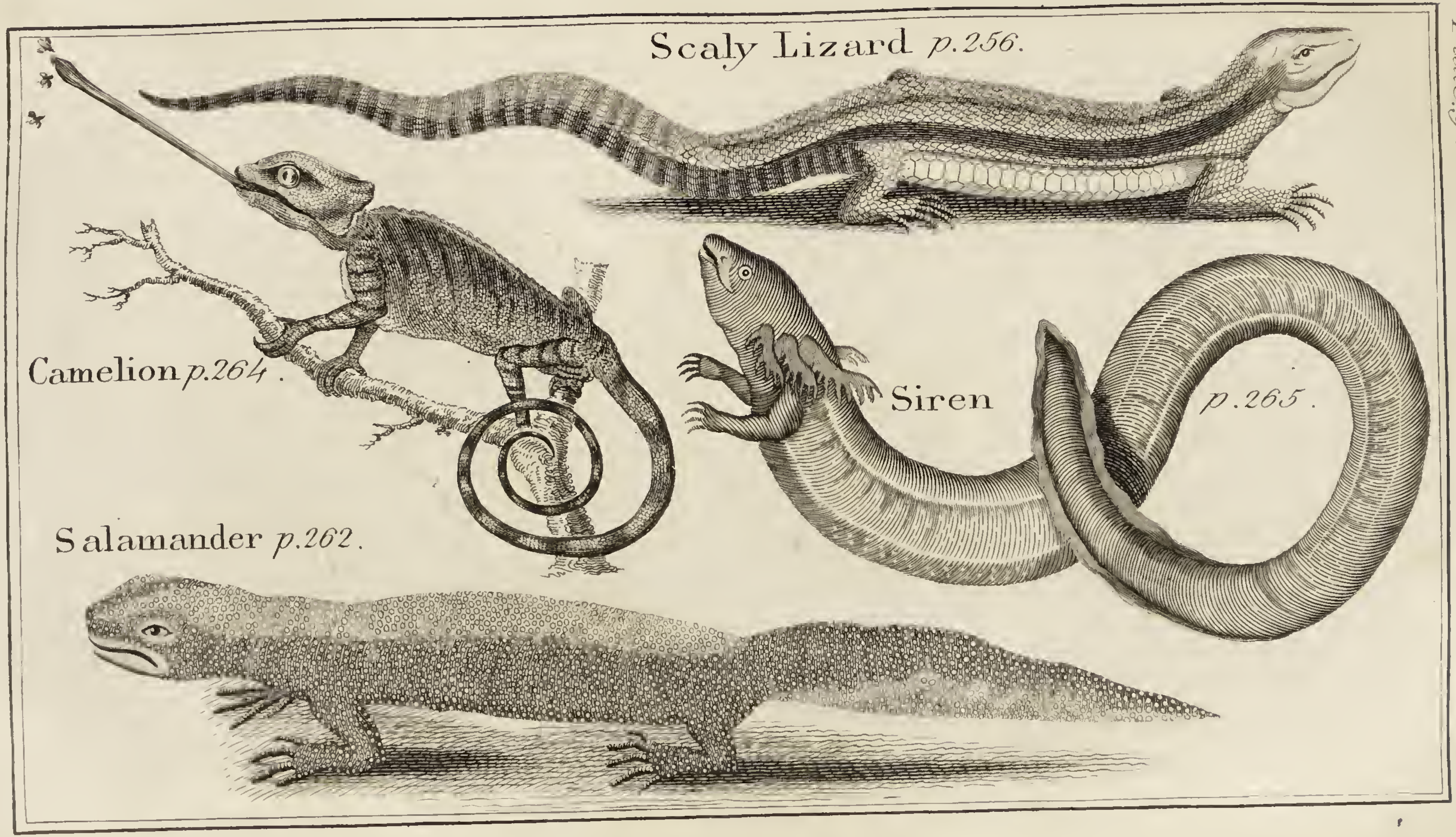
Ditto *p. 245.*

Plate.95.



Crocodile *p* 256

Plate.96.


Scaly Lizard p.256.
Camelion p.264.
Siren
p.265.
Salamander p.262.

force; and their lives generally pay the forfeit of their raſhneſs.

To look for this animal in all its natural terrors, grown to an enormous ſize, propagated in ſurpriſing numbers, and committing unceaſing devaſtations, we muſt go to the uninhabited regions of Africa and America, to thoſe immenſe rivers that roll through extenſive and deſolate kingdoms, where arts have never penetrated, where force only makes diſtinction, and the moſt powerful animals exert their ſtrength with confidence and ſecurity.

Of this terrible animal there are two kinds; the Crocodile, properly ſo called, and the Cayman or Alligator. Travellers, however, have rather made the diſtinction than Nature; for in the general outline, and in the nature of theſe two animals, they are entirely the ſame. The diſtinctions uſually made between the crocodile and alligator are theſe: the body of the crocodile is more ſlender than that of the alligator; its ſnout runs off tapering from the forehead, like that of a greyhound; while that of the other is indented, like the noſe of a lap-dog. The crocodile has alſo a much wider ſwallow, and is of an aſh-colour.

This animal grows to a great length, being ſometimes found 30 feet long, from the tip of the ſnout to the end of the tail; its moſt uſual length, however, is eighteen. One which was diſſected by the Jeſuits at Siam was eighteen feet and an half, French meaſure, in length; of which the tail was no leſs than five feet and an half, and the head and neck above two feet and an half. It was four feet nine inches in circumference, where thickeſt. The fore-legs had the ſame parts and conformation as the arms of a man, both within and without. The hands, if they may be ſo called, had five fingers; the two laſt of which had no nails, and were of a conical figure. The hinder legs, including the thigh and paw, were two feet two inches long; the paws, from the joint to the extremity of the longeſt claws, were above nine inches; they were divided into four toes, of which three were armed with large claws, the longeſt of which was an inch and an half; theſe toes were united by a membrane, like thoſe of a duck, but much thicker. The head was long, and had a little riſing at the top; but the reſt was flat, and eſpecially towards the extremity of the jaws. It was covered by a ſkin, which adhered firmly to the ſkull and to the jaws. The ſkull was rough and unequal in ſeveral places. The eye was very ſmall in proportion to the reſt of the body. The jaws ſeemed to ſhut one within the other; and nothing can be more falſe than that the animal's under jaw is without motion; it moves, like the lower jaw in all other animals, while the upper is fixed to the ſkull, and abſolutely immoveable. The animal had twenty-ſeven cutting teeth in the upper jaw, and fifteen in the lower, with ſeveral void ſpaces between them. The diſtance of the two jaws, when opened as wide as they could be, was fifteen inches and a half: this is a very wide yawn, and could eaſily enough take in the body of a man. From the ſhoulders to the extremity of the tail, the animal was covered with large ſcales, of a ſquare form, diſpoſed like parallel girdles. The creature was covered not only with theſe, but all over with a coat of armour; which, however was not proof againſt a muſquet-ball, contrary to what has been commonly aſſerted. It had no bladder; but the kidneys ſent the urine to be diſcharged by the anus. There were ſixty-two joints in the back-bone, which, though very cloſely united, had ſufficient play to enable the animal to bend like a bow to the right and the left; ſo that what we hear of eſcaping the creature by turning out of the right line, and of the animal's not being able to wheel readily after its prey, ſeems to be fabulous.

Such is the figure and conformation of this formidable animal, that unpeoples countries, and makes the moſt navigable rivers deſert and dangerous. They are ſeen in ſome places, lying for whole hours, and even days, ſtretched in the ſun, and motionleſs; ſo that one not uſed to them, might miſtake them for trunks of trees, covered with a rough and dry bark; but the miſtake would ſoon be fatal, if not prevented: for the torpid animal, at the near approach of any living thing, darts upon it with inſtant ſwiftneſs, and at once drags it down to the bottom. In the times of an inundation, they ſometimes enter the cottages of the natives, where the dreadful viſitant ſeizes the firſt animal it meets with. There have been ſeveral examples of their taking a man out of a canoe in the ſight of his companions, without their being able to lend him any aſſiſtance.

The ſtrength of every part of the crocodile is very great; and its arms, both offenſive and defenſive, irreſiſtible. Moſt naturaliſts have remarked, from the ſhortneſs of its legs, the amazing ſtrength of the tortoiſe: but what is the ſtrength of ſuch an animal, compared to that of the crocodile, whoſe legs are very ſhort, and whoſe ſize is ſo ſuperior? Its principal inſtrument of deſtruction is the tail; with a ſingle blow of this it has often overturned a canoe, and ſeized upon the poor ſavage, its conductor.

Though not ſo powerful, yet it is very terrible even upon land. The crocodile ſeldom, except when preſſed by hunger, or with a view of depoſiting its eggs, leaves the water. Its uſual method is to float along upon the ſurface, and ſeize whatever animals come within its reach; but when this method fails, it then goes cloſer to the bank. Diſappointed of its fiſhy prey, it there waits covered up among the ſedges, in patient expectation of ſome land animal that comes to drink; the dog, the bull, the tiger, or man himſelf. Nothing is to be ſeen of the inſidious deſtroyer as the animal approaches; nor is its retreat diſcovered till it be too late for ſafety. It ſeizes the victim with a ſpring, and goes at a bound much faſter than ſo unweildy an animal could be thought capable of; then, having ſecured the creature with both teeth and claws, it drags it into the water, inſtantly ſinks with it to the bottom, and in this manner quickly drowns it.

Sometimes it happens that the creature the crocodile has thus ſurpriſed, eſcapes from its graſp wounded, and makes off from the river-ſide. In ſuch a caſe, the tyrant purſues with all its force, and often ſeizes it a ſecond time; for, though ſeemingly heavy, the crocodile runs with great celerity. In this manner it is ſometimes ſeen above half a mile from the bank, in purſuit of an animal wounded beyond the power of eſcaping, and then dragging it back to the river-ſide, where it feaſts in ſecurity.

It often happens, in its depredations along the bank, that the crocodile ſeizes on a creature as formidable as itſelf, and meets with a moſt deſperate reſiſtance. We are told of frequent combats between the crocodile and the tiger. All creatures of the tiger kind are continually oppreſſed by a parching thirſt, that keeps them in the vicinity of great rivers, whither they deſcend to drink very frequently. It is upon theſe occaſions that they are ſeized by the crocodile; and they die not unrevenged. The inſtant they are ſeized upon, they turn with the greateſt agility, and force their claws into the crocodile's eyes, while he plunges with his fierce antagoniſt into the river. There they continue to ſtruggle for ſome time, till at laſt the tiger is drowned.

In this manner the crocodile ſeizes and deſtroys all animals, and is equally dreaded by all. There is no animal, but man alone, that can combat it with ſucceſs. We are aſſured by Labat, that a negro, with no other weapons than a knife in his right hand, and his left arm wrapped round with a cow's hide, ventures boldly to attack this animal in its own element. As ſoon as he approaches the crocodile, he preſents his left arm, which the animal ſwallows moſt greedily; but ſticking in his throat, the negro has time to give it ſeveral ſtabs under the throat; and the water alſo getting in at the mouth, which is held involuntarily open, the creature is ſoon bloated up as big as a tun, and expires.

Whatever be the truth of theſe accounts, certain it is, that crocodiles are taken by the Siameſe in great abundance. The manner of taking it is, by throwing three or four ſtrong nets acroſs a river, at proper diſtances from each other; ſo that, if the animal breaks through the firſt, it may be caught by one of the reſt. When it is firſt taken, it employs its tail with great force; but, after many unſucceſsful ſtruggles, it is at laſt exhauſted. Then the natives approach their priſoner in boats, and pierce him with their weapons in the moſt tender parts, till he is weakened with the loſs of blood. When he has done ſtirring, they begin by tying up his mouth; and, with the ſame cord, they faſten his head to his tail; which laſt they bend back like a bow. They are not, however, yet perfectly ſecure from his fury; but, for their greater ſafety, they tie his fore feet, as well as thoſe behind, to the top of his back.

The crocodile, thus brought into ſubjection, or bred up young, is uſed to divert and entertain the great men of the Eaſt. It is often managed like an horſe: a curb is put into its mouth, and the rider directs it as he thinks proper. Though awkwardly formed, it does not fail to proceed with ſome degree of ſwiftneſs, and is thought to move as faſt as ſome of the moſt unweildy of our own animals, the hog, or the cow.

Along the rivers of Africa, this animal is ſometimes taken in the ſame manner as the ſhark. Several Europeans go together in a large boat, and throw out a piece of beef upon a hook and ſtrong fortified line, which the crocodile ſeizing and ſwallowing, is drawn along, floundering and ſtruggling, until its ſtrength is quite exhauſted, when it is pierced in the belly, which is its tendereſt part; and thus, after numberleſs wounds, is drawn aſhore. In this part of the world alſo, as well as at Siam, the crocodile makes an object of ſavage pomp, near the palaces of their monarchs. Philips informs us, that at Sabi, on the Slave Coaſt, there are two pools of water near the Royal Palace, where crocodiles are bred, as we breed carp in our ponds in Europe.

There is a very powerful ſmell of muſk about all theſe animals. Travellers are not agreed in what part of the body theſe muſk-bags are contained; but the moſt probable opinion is, that this ſubſtance is amaſſed in glands under the legs and arms. The crocodile's fleſh is, at beſt, very bad, tough eating; but, unleſs the muſk-bags be ſeparated, it is inſupportable. The Negroes themſelves cannot well digeſt the fleſh; but a crocodile's egg is to them the moſt delicate morſel in the world.

All crocodiles breed near freſh waters; and for this purpoſe, the female, when ſhe comes to lay, chooſes a place by the ſide of a river, or ſome freſh-water lake, to depoſit her brood in. She always pitches upon an extenſive ſandy ſhore, where ſhe may dig a hole without danger of detection from the ground being freſh turned up. There ſhe depoſits from eighty to an hundred eggs, of the ſize of a tennis-ball, and of the ſame figure, covered with a tough, white ſkin, like parchment. She takes above an hour to perform this taſk; and then, covering up the place ſo artfully, that it can ſcarcely be perceived, ſhe goes back, to return again the next day. Upon her return, with the ſame precaution as before, ſhe lays about the ſame number of eggs; and the day following alſo a like number. Thus, having depoſited her whole quantity, and having covered them cloſe up in the ſand, they are ſoon vivified by the heat of the ſun; and, at the end of thirty days, the young ones begin to break open the ſhell. At this time, the female is inſtinctively taught that her young ones want relief; and ſhe goes upon land, to ſcratch away the ſand, and ſet them free. Her brood quickly avail themſelves of their liberty; a part run unguided to the water; another part aſcend the back of the female, and are carried thither in greater ſafety. But the moment they arrive at the water, all natural connection is at an end. The whole brood ſcatters into different parts at the bottom; by far the greateſt number are deſtroyed: and the reſt find ſafety in their agility or minuteneſs.

The open-bellied crocodile is furniſhed with a falſe belly, like the opoſſum, where the young creep out and in, as their dangers or neceſſities require. It is probable that this open-bellied crocodile is viviparous, and foſters her young that are prematurely excluded, in this ſecond womb, until they come to proper maturity.

The *Salamander* (See pl. XCVI.) The ancients have deſcribed a lizard that is bred from heat, that lives in the flames, and feeds upon fire, as its proper nouriſhment. It will be needleſs to ſay that there is no ſuch animal exiſting; and, that above all others, the modern ſalamander has the ſmalleſt affinity to ſuch an abode.

There have been not leſs than ſeven ſorts of this animal deſcribed by Seba; and to have ſome idea of the peculiarity of their figure, if we ſuppoſe the tail of a lizard applied to the body of a frog, we ſhall not be far from preciſion.

But it is not in figure that this animal chiefly differs from the reſt of the lizard tribe. In conformation it is unlike, as the ſalamander is produced alive from the body of its parent, and is completely formed the moment of its excluſion. It differs from them alſo in its general reputation of being venomous; no trials, however, that have been hitherto made, ſeem to confirm the truth of the report.

The ſalamander beſt known in Europe, is from eight to eleven inches long, uſually black, ſpotted with yellow; and, when taken in the hand, feeling cold to a great degree. There are ſeveral kinds. Our black *water newt* is reckoned among the number. The idle report of its being inconſumable by fire, has cauſed many of theſe poor animals to be burnt; but we cannot ſay as philoſophical martyrs; ſince ſcarce any philoſopher could think it neceſſary to make the experiment. When thrown into the fire, the animal is ſeen to burſt with the heat of its ſituation, and to eject its fluids. We are gravely told in the Philoſophical Tranſactions, that this is a method the animal takes to extinguiſh the flames.

The whole of the lizard kind are ſo tenacious of life, that they will live ſeveral hours after the loſs of the head: they alſo ſuſtain the want of food in a ſurpriſing manner. One of them, brought from the Indies, lived nine months, without any other food than what it received from licking a piece of earth, on which it was brought over;

over *; another was kept by Seba, in an empty vial, for ſix months, without any nouriſhment; and Redi talks of a large one, brought from Africa, that lived for eight months, without taking any nouriſhment whatever. Indeed, as many of this kind, both ſalamanders and lizards, are torpid, or nearly ſo, during the winter, the loſs of their appetite, for ſo long a time, is the leſs ſurpriſing.

Directly deſcending from the crocodile, in this claſs, we find the *cordyle*, the *tockay*, and the *tejuguacu*, all growing leſs in the order in which they are named. Theſe fill up the chaſm to be found between the crocodile and the African Iguana.

The *Iguana*, which deſerves our notice, is about three feet long, and the body about as thick as one's thigh. The ſkin is covered with ſmall ſcales, like thoſe of a ſerpent; and the back is furniſhed with a row of prickles, that ſtand up, like the teeth of a ſaw. Both the jaws are full of very ſharp teeth; and the bite is dangerous, though not venomous. The male has a ſkin hanging under his throat, which reaches down to his breaſt; and, when diſpleaſed, he puffs it up like a bladder: he is one-third larger and ſtronger than the female, though the ſtrength of either avails them little towards their defence. The males are aſh-coloured, and the females are green.

The fleſh of theſe may be conſidered as the greateſt delicacy of Africa and America; and the ſportſmen of thoſe climates go out to hunt the iguana, as we do in purſuit of the pheaſant or the hare. In the beginning of the ſeaſon, when the great floods of the tropical climates are paſt away, and vegetation ſtarts into univerſal verdure, the ſportſmen are ſeen, with a nooſe and a ſtick, wandering along the ſides of the rivers, to take the iguana. This animal, though apparently formed for combat, is the moſt harmleſs creature of all the foreſt; it lives among the trees, or ſports in the water, without ever offering to offend. There, having fed upon the flowers of the mahot, and the leaves of the mapou, that grow along the banks of the ſtream, it goes to repoſe upon the branches of the trees that hang over the water. Upon land, the animal is ſwift of foot; but, when once in poſſeſſion of a tree, it ſeems conſcious of the ſecurity of its ſituation, and never offers to ſtir.

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* Phil. Tranſ. ann. 1661. N. 21. art. 7.

There the ſportſman eaſily finds it, and as eaſily faſtens his nooſe round its neck. If the head be placed in ſuch a manner, that the nooſe cannot readily be faſtened, by hitting the animal a blow on the noſe with the ſtick, it lifts the head, and offers it in ſome meaſure to the nooſe. In this manner, and alſo by the tail, the iguana is dragged from the trees, and killed by repeated blows on the head.

The *Cameleon*, (See pl. XCVI.) is a very different animal; and as the iguana ſatisfies the appetites of the epicure, this is rather the feaſt of the philoſopher. Like the crocodile, this little animal proceeds from an egg; and it alſo nearly reſembles that formidable creature in form.

The head of a large cameleon is almoſt two inches long; and thence to the beginning of the tail, four and a half; the tail is five inches long, and the feet two and a half; the thickneſs of the body is different at different times; for ſometimes, from the back to the belly, it is two inches, and ſometimes but one; for it can blow itſelf up, and contract itſelf at pleaſure. This ſwelling and contraction is not only of the back and belly, but of the legs and tail.

The cameleon has a power of driving the air it breathes over every part of the body: however, it only gets between the ſkin and the muſcles; for the muſcles themſelves are never ſwollen. The ſkin is very cold to the touch; and though the animal ſeems ſo lean, there is no feeling the beating of the heart. The ſurface of the ſkin is unequal, and has a grain not unlike ſhagreen, but very ſoft, becauſe each eminence is as ſmooth as if it were poliſhed. The colour of all theſe eminences, when the cameleon is at reſt in a ſhady place, is of a bluiſh grey; and the ſpace between is of a pale red and yellow.

But when the animal is removed into the ſun, then comes the wonderful part of its hiſtory. At firſt, it appears to ſuffer no change of colour, its greyiſh ſpots ſtill continuing the ſame: but the whole ſurface ſoon ſeems to imbibe the rays of light; and the ſimple colouring of the body changes into a variety of beautiful hues. Wherever the light comes upon the body, it is of a tawny brown; but that part of the ſkin on which the ſun does not ſhine, changes into ſeveral brighter colours, pale yellow, or vivid crimſon; which form ſpots of the ſize of half one's finger: ſome of theſe deſcend from the ſpine half way down the back; and others appear on the ſides, arms, and tail. Sometimes the animal becomes all over ſpotted with brown ſpots, of a greeniſh caſt. When it is wrapped up in a white linen cloth for two or three minutes, the natural colour becomes much lighter; but not quite white, as ſome authors have pretended: however, it muſt not hence be concluded that the cameleon aſſumes the colour of the objects which it approaches; this is entirely an error, and probably has taken its riſe from the continual changes it appears to undergo.

When the cameleon changes place, and attempts to deſcend from an eminence, it moves with the utmoſt precaution, advancing one leg very deliberately before the other, ſtill ſecuring itſelf by holding whatever it can graſp by the tail. It ſeldom opens the mouth, except for freſh air; and, when that is ſupplied, diſcovers its ſatisfaction by its motions, and the frequent changes of its colour. The tongue is ſometimes darted out after its prey, which is flies; and this is as long as the whole body. The eyes are remarkably little, though they ſtand out of the head; but the moſt extraordinary part of their conformation is, that the animal often moves one eye, when the other is entirely at reſt; nay, ſometimes one eye will ſeem to look directly forward, while the other looks backward; and one will look upwards, while the other regards the earth.

To this claſs of lizards we may refer the *dragon*, a moſt terrible animal; if we were to credit the invention of fable and ſuperſtition. Happily, however, ſuch ravagers are no where found to exiſt at preſent; and the whole race of dragons is dwindled down to the flying lizard, a little harmleſs creature, that only preys upon inſects, and even ſeems to embelliſh the foreſt with its beauty.

The *Siren* (See pl. XCVI.) is a creature not leſs extraordinary. It is the only biped in this claſs of animals. In Carolina it is called the mud iguana, as it is chiefly found in muddy and ſwampy places.

The *Tarantula* (See pl. XCIII.) is rather famous for the horror which it excites in the inhabitants of Italy, than for any other property. It is a deformed brown lizard, ſomewhat thicker and rounder than other lizards, and which, like our *eft*, is found in old walls, or under the ruins of buildings. In peruſing the accounts of naturaliſts and travellers, it will be neceſſary to obſerve the diſtinction between this animal and the ſpider, which is called tarantula, and of which we ſhall ſpeak when we come to treat of inſects.

The laſt animal of the lizard kind we ſhall mention, is the *Chalcidian Lizard*, of Aldrovandus, very improperly called the ſeps, by modern hiſtorians. This animal ſeems to make the ſhade that ſeparates the lizard from the ſerpent race. It has four legs, like the lizard; but ſo ſhort, as to be utterly unſerviceable in walking: it has a long ſlender body, like the ſerpent; and it is ſaid to have the ſerpent's malignity alſo. Theſe animals are found above three feet long, and thick in proportion, with a large head, and pointed ſnout. The whole body is covered with ſcales; and the belly is white, mixed with blue. It has four crooked teeth; as alſo a pointed tail, which, however, can inflict no wound. It is viviparous: upon the whole, it appears to bear a ſtrong affinity to the viper; and, like that animal, its bite may be dangerous.

CHAP XXXIV.

Of Serpents—Of the venomous Kind—The Viper—The Rattle-ſnake—The Whip-ſnake—The Aſp—The Jaculus—The Hæmorrhois—The Seps—The Coral Snake—The Cobra-capella—Serpents without Venom—The Ringed Snake—The Blind Worm—The Amphiſbæna—The Eſculapian—The Boyuna—The Surinam Serpent—The Prince of Serpents—The Gerenda—The Jiboya—The Boiguacu—The Depona.

OF SERPENTS.] IN none of the countries of Europe is the ſerpent tribe ſufficiently numerous to be truly terrible. The various malignity alſo that has been aſcribed to European ſerpents of old, is now utterly unknown; there are not above three or four kinds that are dangerous, and the poiſon of all operates in the ſame manner. A burning pain in the part, eaſily removable by timely applications, is the worſt effect that we experience from the bite of the moſt venomous ſerpents of Europe.

Though, however, Europe be happily delivered from theſe reptiles, in the warm countries that lie within the tropic, as well as in the cold regions of the north, where the inhabitants are few, the ſerpents propagate in equal proportion. All along the ſwampy banks of the river Niger or Oroonoko, where the ſun is hot, the foreſts thick, and the men but few, the ſerpents cling among the branches of the trees in infinite numbers, and carry on an unceaſing war againſt all other animals in their vicinity. Travellers have aſſured us, that they have often ſeen large ſnakes twining round the trunk of a tall tree, encompaſſing it like a wreath, and thus riſing and deſcending at pleaſure. In theſe countries, therefore, the ſerpent is too formidable to become an object of curioſity, for it excites much more violent ſenſations.

We are not, therefore, to reject as wholly fabulous, the accounts left us by the ancients of the terrible devaſtations committed by a ſingle ſerpent. It is probable, in early times, when the arts were little known, and mankind were but thinly ſcattered over the earth, that ſerpents, continuing undiſturbed poſſeſſors of the foreſt, grew to an amazing magnitude; and every other tribe of animals fell before them. We have many hiſtories of antiquity, preſenting us ſuch a picture; and exhibiting a whole nation ſinking under the ravages of a ſingle ſerpent. We are told, that while Regulus led his army along the banks of the river Bagrada, in Africa, an enormous ſerpent diſputed his paſſage over. We are aſſured by Pliny, who ſays, that he himſelf ſaw the ſkin, that it was an hundred and twenty feet long, and that it had deſtroyed many of the army. At laſt however the battering engines were brought out againſt it; and theſe aſſailing it at a diſtance, it was ſoon deſtroyed.

With reſpect to their conformation, all ſerpents have a very wide mouth, in proportion to the ſize of the head; and, what is very extraordinary, they can gape and ſwallow the head of another animal which is three times as big as their own. To explain this, it muſt be obſerved, that the jaws of this animal do not open as ours, in the manner of a pair of hinges, where bones are applied to bones, and play upon one another; on the contrary, the ſerpent's jaws are held together at the roots by a ſtretching muſcular ſkin; by which means they open as widely as the animal chuſes to ſtretch them, and admit of a prey much thicker than the ſnake's own body. The throat, like ſtretching leather, dilates to admit the morſel; the ſtomach receives it in part; and the reſt remains in the gullet, till putrefaction and the juices of the ſerpent's body unite to diſſolve it.

As to the teeth, we ſhall ſpeak more of them when we come to treat of the viper's poiſon. The tongue in all theſe animals is long and forky. It is compoſed of two long, fleſhy ſubſtances, which terminate in ſharp points, and are very pliable. Some of the viper kind have tongues a fifth part of the length of their bodies; they are continually darting them out, but they are entirely harmleſs, and only terrify thoſe who are ignorant of the real ſituation of their poiſon.

The ſkin is compoſed of a number of ſcales, united to each other by a tranſparent membrane, which grows harder as it grows older, until the animal changes, which is generally done twice a year. This cover then burſts near the head, and the ſerpent creeps from it, by an undulatory motion, in a new ſkin, much more vivid than the former. As the edges of the foremoſt ſcales lie over the ends of their following ſcales, ſo thoſe edges, when the ſcales are erected, which the animal has a power of doing in a ſmall degree, catch in the ground, like the nails in the wheel of a chariot, and ſo promote and facilitate the animal's progreſſive motion. The erecting theſe ſcales, is by means of a multitude of diſtinct muſcles, with which each is ſupplied, and one end of which is tacked each to the middle of the foregoing.

This tribe of animals, like that of fiſhes, ſeems to have no bounds put to their growth: their bones are in a great meaſure cartilaginous, and they are conſequently capable of great extenſion; the older, therefore, a ſerpent becomes, the larger it grows; and as they ſeem to live to a great age, they arrive at an enormous ſize.

Leguat aſſures us, that he ſaw a ſerpent in Java, that was fifty feet long; and Carli mentions their growing to above forty feet. Mr. Wentworth, who had large concerns in the Brebices in America, aſſures us, that, in that country, they grow to an enormous length. He one day ſent out a ſoldier, with an Indian, to kill wild fowl for the table; and they accordingly went ſome miles from the fort: in purſuing their game, the Indian, who generally marched before, beginning to tire, went to reſt himſelf upon the fallen trunk of a tree, as he ſuppoſed it to be; but when he was juſt going to ſit down, the enormous monſter began to move, and the poor ſavage perceiving that he had approached a Liboya, the greateſt of all the ſerpent kind, dropped down in an agony. The ſoldier, who perceived at ſome diſtance what had happened, levelled at the ſerpent's head, and, by a lucky aim, ſhot it dead; however, he continued his fire, until he was aſſured that the animal was killed; and then going up to reſcue his companion, who was fallen motionleſs by its ſide, he, to his aſtoniſhment, found him dead likewiſe, being killed by the fright. Upon his return to the fort, and telling what had happened, Mr. Wentworth ordered the animal to be brought up, when it was meaſured, and found to be thirty-ſix feet long.

In the Eaſt Indies they grow alſo to an enormous ſize; particularly in the iſland of Java, where, we are aſſured, that one of them will deſtroy and devour a buffalo. In a letter printed in the German Ephemerides, we have an account of a combat between an enormous ſerpent and a buffalo, by a perſon, who aſſures us, that he was himſelf a ſpectator. The ſerpent had, for ſome time, been waiting near the brink of a pool, in expectation of its prey; when a buffalo was the firſt that offered. Having darted upon the affrighted animal, it inſtantly began to wrap it round with its voluminous twiſtings; and at every twiſt the bones of the buffalo were heard to crack almoſt as loud as the report of a cannon. It was in vain that the poor animal ſtruggled and bellowed; its enormous enemy entwined it too cloſely to get free; till at length, all its bones being maſhed to pieces, like thoſe of a malefactor on the wheel, and the whole body reduced to one uniform maſs, the ſerpent untwined its folds to ſwallow its prey at leiſure. To prepare for this, and in order to make the body ſlip down the throat more glibly, it was ſeen to lick the whole body over, and thus cover it with its mucus. It then began to ſwallow it at that end that offered leaſt reſiſtance; while its length of body was dilated to receive its prey, and thus took in at once a morſel that was three times its own thickneſs. We are aſſured by travellers, that theſe animals are often found with the body of a ſtag in their gullet, while the horns, which they are unable to ſwallow, keep ſticking out at their mouths.

But it is happy for mankind, that the rapacity of theſe frightful creatures is often their puniſhment; for, whenever any of the ſerpent kind have gorged themſelves in this manner, whenever their body is ſeen particularly diſtended with food, they then become torpid, and may be approached and deſtroyed with ſafety.

Other creatures have a choice in their proviſion; but the ſerpent indiſcriminately preys upon all; the buffalo, the tiger, and the gazelle. One would think that the porcupine's quills might be ſufficient to protect it; but whatever has life, ſerves to appeaſe the hunger of theſe devouring creatures: porcupines, with all their quills, have frequently been found in their ſtomachs, when killed and opened; nay, they moſt frequently are ſeen to devour each other.

But though theſe animals are, above all others, the moſt voracious; and though the morſel which they ſwallow without chewing, is greater than what any other creature, either by land or water, the whale itſelf not excepted, can devour, yet no animals upon earth bear abſtinence ſo long as they. A ſingle meal, with many of the ſnake kind, ſeems to be the adventure of a ſeaſon; and is an occurrence for which they have been for weeks, nay, ſometimes for months, in patient expectation of. Their prey continues, for a long time, partly in the ſtomach, partly in the gullet; and a part is often ſeen hanging out of the mouth. In this manner it digeſts by degrees; and in proportion as the part below is diſſolved, the part above is taken in. It is not therefore till this tedious operation is entirely performed, that the ſerpent renews its appetite and its activity. But ſhould any accident prevent it from iſſuing once more from its cell, it ſtill can continue to bear famine for weeks, months, nay, for years together. Vipers are often kept in boxes for ſix or eight months, without any food whatever; and there are little ſerpents ſometimes ſent over to Europe, from Grand Cairo, that live for ſeveral years in glaſſes, and never eat at all, nor even ſtain the glaſs with their excrement. Thus the ſerpent tribe unite in themſelves two very oppoſite qualities; wonderful abſtinence, and yet incredible rapacity.

Though all ſerpents are amphibious, ſome are much fonder of the water than others; and though deſtitute of fins or gills, remain at the bottom, or ſwim along the ſurface with great eaſe. They can, however, endure to live in freſh-water only; for ſalt is an effectual bane to the whole tribe.

Some ſerpents have a moſt horrible fœtor attending them, which is alone capable of intimidating the brave. This proceeds from two glands near the vent, like thoſe in the weaſel or the pole-cat; and, like thoſe animals, in proportion as they are excited by rage or by fear, the ſcent grows ſtronger. It would ſeem, however, that ſuch ſerpents as are moſt venomous, are leaſt offenſive in this particular; ſince the rattleſnake and the viper have no ſmell whatever: nay, we are told that at Calecut and Cranganor, in the Eaſt Indies, there are ſome very noxious ſerpents, who are ſo far from being diſagreeable, that their excrements are ſought after, and kept as the moſt pleaſing perfume. The Eſculapian ſerpent is alſo of this number.

Some ſerpents bring forth their young alive; as the viper; ſome bring forth eggs, which are hatched by the heat of their ſituation; as the common black ſnake, and the majority of the ſerpent tribe. When a reader, ignorant of anatomy, is told, that ſome of thoſe animals produce their young alive, and that ſome produce eggs only, he is apt to ſuppoſe a very great difference in the internal conformation, which makes ſuch a variety in the manner of bringing forth. But this is not the caſe: theſe animals are internally alike, in whatever manner they produce their young; and the variety in their bringing forth, is rather a ſlight than a real diſcrimination. The only difference is, that the viper hatches her eggs, and brings them to maturity within her body; the ſnake is more premature in her productions, and ſends her eggs into the light ſome time before the young ones are capable of leaving the ſhell. Thus, if either are opened, the eggs will be found in the womb, covered with their membranous ſhell, and adhering to each other, like large beads on a ſtring. In the eggs of both, the young ones will be found, though at different ſtages of maturity: thoſe of the viper will crawl and bite in the moment the ſhell that encloſes them is broken open; thoſe of the ſnake are not yet arrived at their perfect form.

Father Labat took a ſerpent of the viper kind, that was nine feet long, and ordered it to be opened in his preſence. He then ſaw the manner in which the eggs of theſe animals lie in the womb. In this creature there were ſix eggs, each of the ſize of a gooſe egg, but longer, more pointed, and covered with a membranous ſkin, by which alſo they were united to each other. Each of theſe eggs contained from thirteen to fifteen young ones, about ſix inches long, and as thick as a gooſe quill. Theſe little miſchievous animals were no ſooner let looſe from the ſhell, than they crept about, and put themſelves into a threatening poſture, coiling themſelves up and biting the ſtick with which he was deſtroying them. In this manner, he killed ſeventy-four young ones; thoſe that were contained in one of the eggs eſcaped at the place where the female was killed, by the burſting of the egg, and their getting among the buſhes.

The laſt diſtinction that we ſhall mention, but the moſt material among ſerpents is, that ſome are venomous and ſome inoffenſive, but not above a tenth of their number are actually venomous.

From theſe noxious qualities in the ſerpent kind, it is no wonder that not only man, but beaſts and birds, carry on an unceaſing war againſt them. The ichneumon of the Indians, and the peccary of America, deſtroy them in great numbers. Theſe animals have the art of ſeizing them near the head; and it is ſaid that they can ſkin them with great dexterity. The vulture and the eagle alſo prey upon them in great abundance; and often ſouſing down from the clouds, drop upon a long ſerpent, which they ſnatch ſtruggling and writhing in the air. Dogs alſo are bred up to oppoſe them.

Father Feuillée tells us, that being in the woods of Martinico, he was attacked by a large ſerpent, which he could not eaſily avoid, when his dog immediately came to his relief, and ſeized the aſſailant with great courage. The ſerpent entwined him, and preſſed him ſo violently, that the blood came out of his mouth, and yet the dog never ceaſed till he had torn it to pieces. The dog was not ſenſible of his wounds during the fight; but ſoon after, his head ſwelled prodigiouſly, and he lay on the ground as dead. But his maſter having found, hard by, a banana-tree, he applied its juice, mixed with treacle, to the wounds; which recovered the dog, and quickly healed his ſores.

In India there is nothing ſo common as dancing ſerpents, which are carried about in a broad flat veſſel ſomewhat reſembling a ſieve. Theſe erect and put themſelves in motion at the word of command. When their keeper ſings a ſlow tune, they ſeem by their heads to keep time; when he ſings a quicker meaſure, they appear to move more briſk and lively. All animals have a certain degree of docility; and we find that ſerpents themſelves can be brought to move and approach at the voice of their maſter. From this trick ſucceſsfully practiſed before the ignorant, it is moſt probable has ariſen all the boaſted pretenſions which ſome have made to charming of ſerpents; an art to which the native Americans pretend at this very day.

Of venomous Serpents.] In all countries, the poiſon of the ſerpent is ſufficiently formidable to deſerve notice, and to excite our attention to its nature and effects. It will therefore, in the firſt place, be proper to deſcribe its ſeat in the animal, as alſo the inſtrument by which the wound is made and the poiſon injected. In all this venomous claſs of reptiles, whether the viper, the rattle-ſnake, or the cobra di capello, there are two large teeth or fangs that iſſue from the upper jaw, and that hang out beyond the lower. The reſt of the ſnake tribe are deſtitute of theſe; and it is moſt probable, that wherever theſe fangs are wanting, the animal is harmleſs; on the contrary, wherever they are found, it is to be avoided as the moſt peſtilent enemy. Our firſt great attention, therefore, upon ſeeing a ſerpent ſhould be directed to the teeth. The black ſnake, the liboya, the blind worm, and a hundred others that might be mentioned, have their teeth of an equal ſize, fixed into the jaws, and with no other apparatus for inflicting a dangerous wound than a dog or a lizard; but it is otherwiſe with the venomous tribe we are now deſcribing; theſe are well furniſhed, not only with an elaboratory, where the poiſon is formed, but a canal, by which it is conducted to the jaw, a bag under the tooth for keeping it ready for every occaſion, and alſo an aperture in the tooth itſelf for injecting it into the wound. The venom contained in this bag is a yellowiſh, thick, taſteleſs liquor, which injected into the blood is death, yet which may be ſwallowed without any danger.

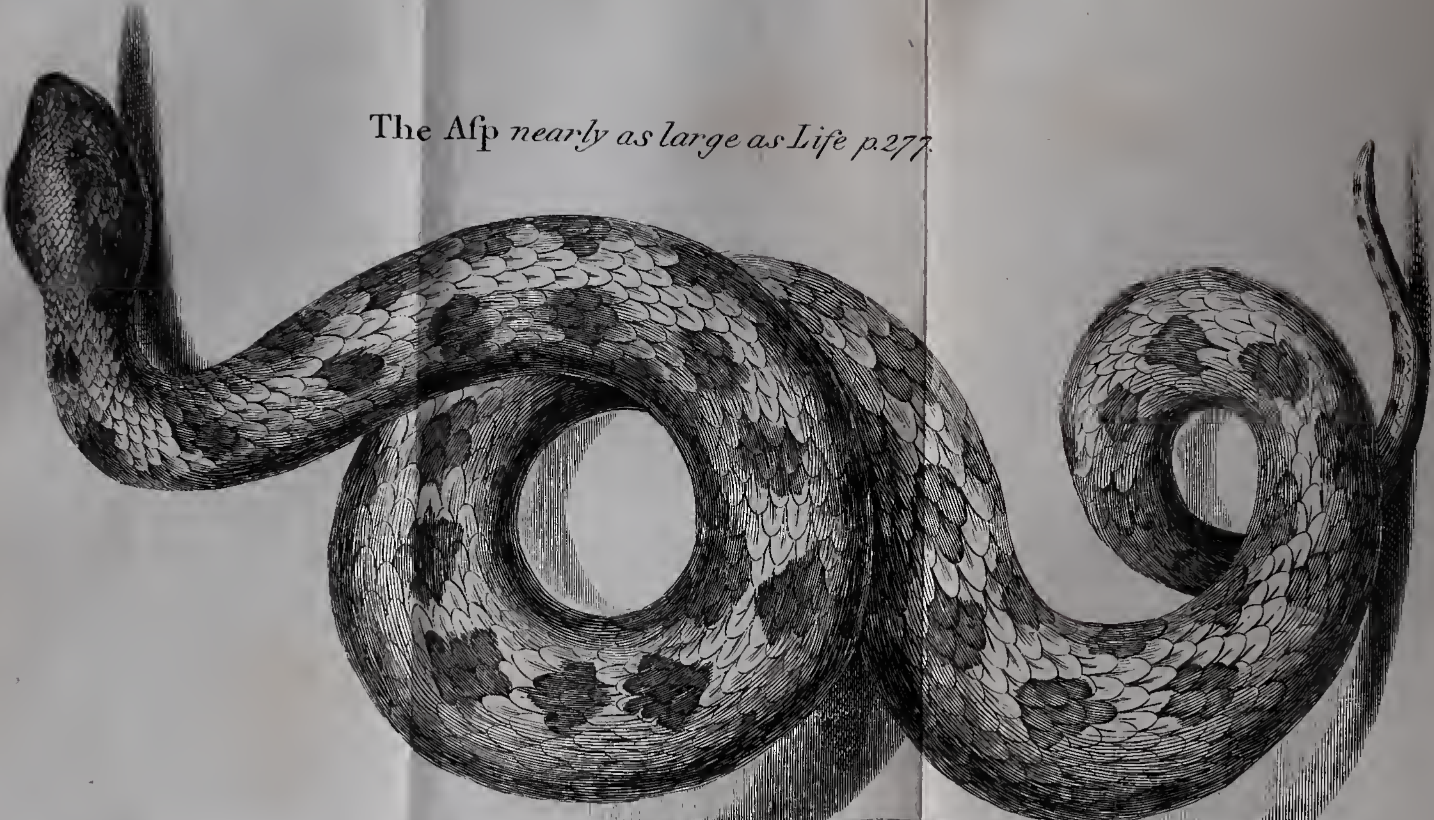
The fangs that give the wound are large in proportion to the ſize of the animal that bears them; crooked, yet ſharp enough to inflict a ready wound. They grow one on each ſide, and ſometimes two from two moveable bones in the upper jaw, which, by ſliding backward or forward, have a power of erecting or depreſſing the teeth at pleaſure. In theſe bones are alſo fixed many teeth, but no way venomous, and only ſerving to take and hold the animal's prey. If a viper inflicts the wound, and the remedy be neglected, the ſymptoms are not without danger. It firſt cauſes an acute pain in the place affected, attended with a ſwelling, firſt red, and afterwards livid. To this ſucceed great ſickneſs at the ſtomach, bilious and convulſive vomitings, cold ſweats, pains about the navel, and death itſelf. Theſe ſymptoms are much more violent, and ſucceed each other more rapidly after the bite of a rattle-ſnake; but when the perſon is bit by the cobra di capello, he dies in an hour, his whole frame being diſſolved into a putrid maſs of corruption.

In the eaſtern and weſtern Indies, the number of noxious ſerpents is various; in England the inhabitants are acquainted only with one. The viper is the only animal of Great Britain whoſe bite is dangerous. In the tropical climates, the rattle-ſnake, the whip-ſnake, and the cobra di capello, are the moſt formidable, though by no means the moſt common.

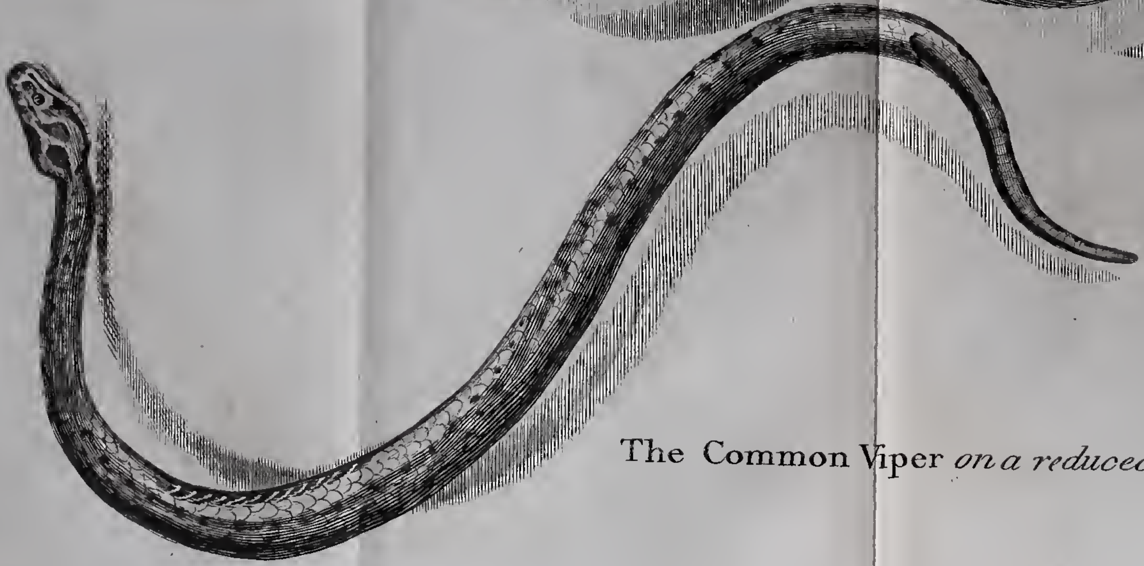
Vipers (See pl. XCVII.) are found in many parts of Europe; but the dry, ſtony, and in particular the chalky countries abound with them. This animal ſeldom grows to a greater length than two feet; though ſometimes they are found above three. The ground colour of their bodies is a dirty yellow; that of the female is deeper. The back is marked the whole length with a ſeries of rhomboid black ſpots, touching each other at the points; the ſides with triangular ones, the belly entirely black. It is chiefly diſtinguiſhed from the common ringed ſnake by the colour, which in the latter is more beautifully mottled, as well as by the head, which is thicker than the body; but particularly by the tail, which, in the viper, though it ends in a point, does not run tapering to ſo great a length as in the other. When, therefore, other diſtinctions fail, the difference of the tail can be diſcerned at a ſingle glance.

The viper differs from moſt other ſerpents in being much ſlower, as alſo in excluding its young completely formed, and bringing them forth alive. The kindneſs of Providence ſeems exerted not only in diminiſhing the ſpeed, but alſo the fertility, of this dangerous creature. They copulate in May, and are ſuppoſed to be about three months before they bring forth, and have ſeldom above eleven eggs at a time. Theſe are of the ſize of a blackbird's egg, and chained together in the womb like a ſtring of beads. Each egg contains from one to four young ones; ſo that the whole of a brood may amount to about twenty or thirty. They continue in the womb till they come to ſuch perfection as to be able to burſt from the ſhell; and they are ſaid by their own efforts to creep from their confinement into the open air, where they continue for ſeveral days without taking any food whatſoever.

The



The Aſp *nearly as large as Life p.277.*



The Common Viper *on a reduced Scale p.274.*

The viper is capable of ſupporting very long abſtinence, it being known that ſome have been kept in a box ſix months without food; yet during the whole time they did not abate of their vivacity. They feed only a ſmall part of the year, but never during their confinement; for if mice, their favourite diet, ſhould at that time be thrown into their box, though they will kill, yet they will never eat them. When at liberty, they remain torpid throughout the winter; yet, when confined, have never been obſerved to take their annual repoſe.

They are uſually taken with wooden tongs, by the end of the tail, which may be done without danger; for, while held in that poſition, they are unable to wind themſelves up to hurt their enemy: yet, notwithſtanding this precaution, the viper-catchers are frequently bitten by them; but, by the application of olive-oil, the bite is effectually cured.

THE RATTLE-SNAKE (See pl. XCVIII.) is bred in America, and in no part of the old world. Some are as thick as a man's leg, and ſix feet in length; but the moſt uſual ſize is from four to five feet long. In moſt particulars it reſembles the viper: it differs, however, in having a large ſcale, which hangs like a penthouſe over each eye. They are of an orange tawny, and blackiſh colour on the back; and of an aſh-colour on the belly, inclining to lead. The male may be readily diſtinguiſhed from the female, by a black velvet ſpot on the head, and by the head being ſmaller and longer. But that which beſides their ſuperior malignity, diſtinguiſhes them from all other animals, is their rattle, an inſtrument lodged in their tail, by which they make ſuch a loud, rattling noiſe, when they move, that their approach may readily be perceived, and the danger avoided. This rattle, which is placed in the tail, ſomewhat reſembles, when taken from the body, the curb chain of a bridle: it is compoſed of ſeveral thin, hard, hollow bones, linked to each other, and rattling upon the ſlighteſt motion. It is ſuppoſed by ſome, that the ſnake acquires an additional bone every year; and that, from this, its age may be preciſely known: however this may be, certain it is, that the young ſnakes, of a year or two old, have no rattles at all; while many old ones have been killed, that had from eleven to thirteen joints each. They ſhake and make a noiſe with theſe rattles with prodigious quickneſs when they are diſturbed; however, the peccary and the vulture are no way terrified at the ſound, but haſten, at the ſignal, to ſeize the ſnake, as their moſt favourite prey.

It is very different with almoſt every other animal. The certain death which enſues from this terrible creature's bite, makes a ſolitude wherever it is heard. It moves along with the moſt majeſtic rapidity; neither ſeeking to offend the larger animals, nor fearing their inſults. If unprovoked, it never meddles with any thing but its natural prey; but when accidentally trod upon, or purſued to be deſtroyed, it then makes a dreadful and deſperate defence. It erects itſelf upon its tail, throws back the head, and inflicts its wound in a moment; then parts, and inflicts a ſecond wound: after which, we are told, by ſome, that it remains torpid and inactive, without even attempting to eſcape.

The very inſtant the wound is inflicted, though ſmall in itſelf, it appears more painful than the ſting of a bee. This pain, which is ſo ſuddenly felt, far from abating, grows every moment more excruciating and dangerous: the limb ſwells; the venom reaches the head, which is ſoon of a monſtrous ſize; the eyes are red and fiery; the heart beats quick, with frequent interruptions: the pain becomes inſupportable, and ſome expire under it in five or ſix hours; but others, who are of ſtronger conſtitutions, ſurvive the agony for a few hours longer only to ſink under a general mortification which enſues, and corrups the whole body.

A ſerpent, called the WHIP-SNAKE, is ſtill more venomous than the former. This animal, which is a native of the Eaſt, is about five feet long, yet not much thicker than the thong of a coachman's whip. It is exceedingly venomous; and its bite is ſaid to kill in about ſix hours. One of the Jeſuit miſſionaries, happening to enter into an Indian pagoda, ſaw what he took to be a whip-cord lying on the floor, and ſtooped to take it up; but, upon handling it, what was his ſurprize to find that it was animated, and no other than the whip-ſnake, of which he had heard ſuch formidable accounts. Fortune, however, ſeemed favourable to him; for he graſped it by the head, ſo that it had no power to bite him, and only twiſted its folds up his arm. In this manner he held it, till it was killed by thoſe who came to his aſſiſtance.

To this formidable claſs might be added the ASP (See pl. XCVII.) whoſe bite, however, is not attended with thoſe drowſy ſymptoms which the ancients aſcribed to it. The JACULUS of Jamaica alſo, is one of the ſwifteſt of the ſerpent kind. The HÆMORRHOIS, ſo called from the hæmorrhages which its bite is ſaid to produce; the SEPS, whoſe wound is very venomous, and cauſes the part affected to corrupt in a very ſhort time; the CORAL SERPENT, which is red, and whoſe bite is ſaid to be fatal. But the COBRA DI CAPELLO, or Hooded Serpent, inflicts the moſt deadly and incurable wounds. Of this formidable creature, there are five or ſix different kinds; but they are all equally dangerous, and their bite is followed by ſpeedy and certain death. It is from three to eight feet long, with two large fangs hanging out of the upper jaw. It has a broad neck, and a mark of dark brown on the forehead; which, when viewed frontwiſe, looks like a pair of ſpectacles; but behind, like the head of a cat. The eyes are fierce, and full of fire; the head is ſmall, and the noſe flat, though covered with very large ſcales, of a yellowiſh aſh-colour; the ſkin is white; and the large tumour on the neck is flat, and covered with oblong, ſmooth ſcales.

OF SERPENTS WITHOUT VENOM.] This claſs of ſerpents all want that artificial mechaniſm by which the poiſonous tribe inflict ſuch deadly wounds: they have no gland in the head for preparing venom; no conduits for conveying it to the teeth; no receptacles there; no hollow in the inſtrument that inflicts the wound. Their bite, when the teeth happen to be large enough to penetrate the ſkin, for in general they are too ſmall for this purpoſe, is attended with no other ſymptoms than thoſe of an ordinary puncture; and many of this tribe, as if ſenſible of their own impotence, cannot be provoked to bite, though ever ſo rudely aſſaulted. They hiſs, dart out their forky tongues, erect themſelves on the tail, and call up all their terrors to intimidate their aggreſſors, but ſeem to conſider their teeth as unneceſſary inſtruments of defence, and never attempt to uſe them. Even among the largeſt of this kind, the teeth are never employed, in the moſt deſperate engagements. When a hare or a bird is caught, the teeth may ſerve to prevent ſuch ſmall game from eſcaping; but, when a buffalo or a tiger is to be encountered, it is by the ſtrong folds of the body, by the fierce verberations of the tail, that the enemy is deſtroyed: by this twining round, and drawing the knot with convulſive energy, this enormous reptile breaks every bone in the quadruped's body, and then, at one morſel, devours its prey.

Hence we may diſtinguiſh the unvenomous tribe into two kinds: firſt, into thoſe which are ſeldom found of any conſiderable magnitude, and that never offend animals larger or more powerful than themſelves, but which find their chief protection in flight, or in the doubtfulneſs of their form; ſecondly, into ſuch as grow to an enormous ſize, fear no enemy, but indiſcriminately attack all other animals, and devour them. Of the firſt kind is the common ringed ſnake, the blind worm, the Eſculapian ſerpent, the Amphiſbæna, and ſeveral others. Of the ſecond, the Jiboya, the Boiguacu, the Depona, and the Boiquatrara.

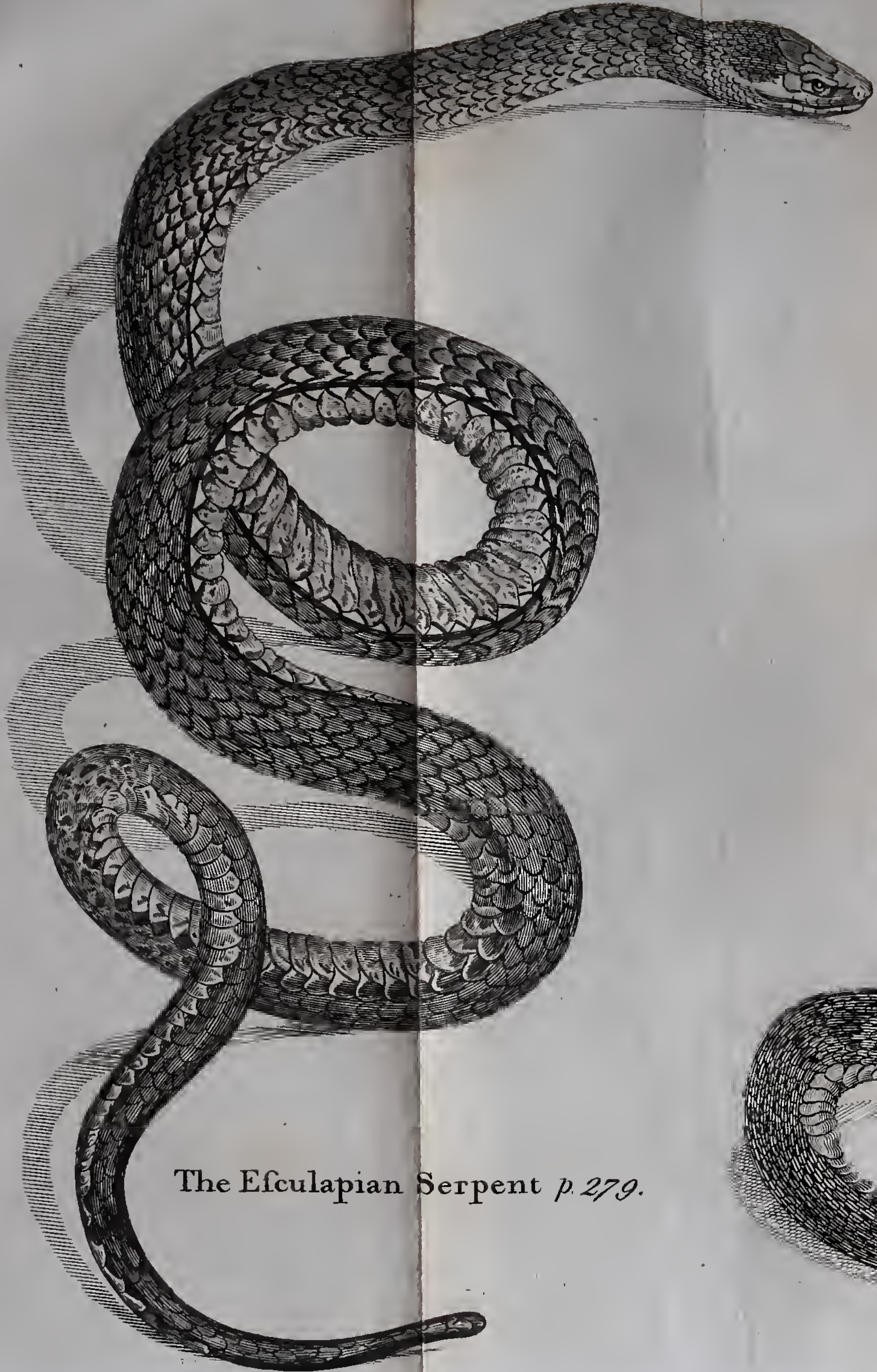
The *Ringed Snake*, is the largeſt of Engliſh ſerpents; ſometimes exceeding four feet in length. The neck is ſlender, the middle of the body thick, the back and ſides covered with ſmall ſcales; the belly with oblong, narrow, tranſverſe plates; the colour of the back and ſides is of a duſky brown; the middle of the back marked with two rows of ſmall black ſpots, running from the head to the tail; the plates on the belly are duſky; the ſcales on the ſides are of a bluiſh white; the teeth are ſmall and ſerrated, lying on each ſide of the jaw, in two rows. The whole ſpecies is perfectly inoffenſive, taking ſhelter in dunghills, and among buſhes in moiſt places; whence they ſeldom remove, unleſs in the midſt of the day, in ſummer, when they are called out by the heat, to baſk themſelves in the ſun.

This ſnake preys upon frogs, inſects, worms, mice, and young birds; and, conſidering the ſmallneſs of the neck, it is amazing how large an animal it will ſwallow.

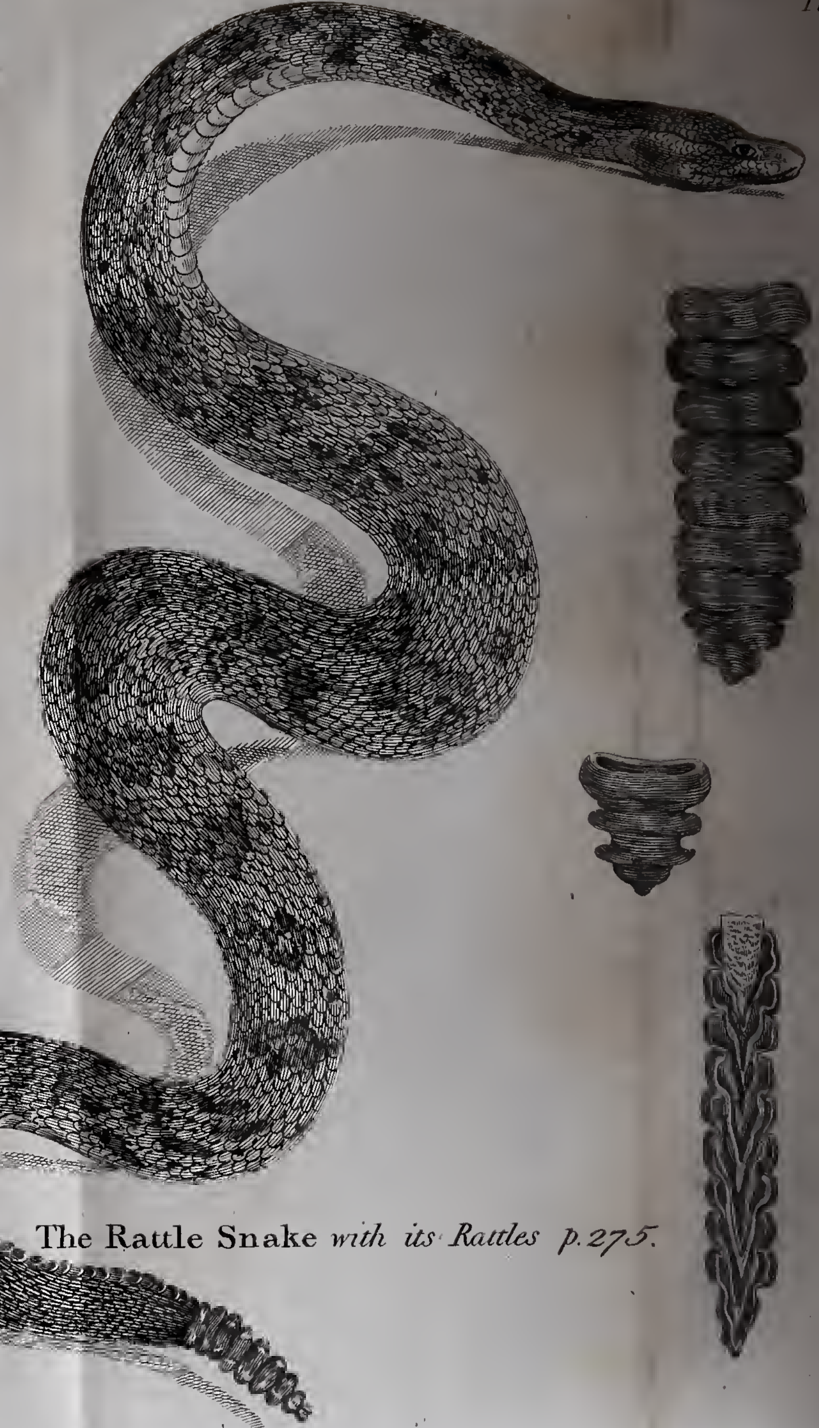
The *black ſnake* of Virginia, which is larger than the above, and generally grows to ſix feet long, takes a prey proportionable to its ſize; partridges, chickens, and young ducks. It is generally found in the neighbourhood of the hen-rooſt, and will devour the eggs, even while the hen is ſitting upon them; theſe it ſwallows whole; and often, after it has done the miſchief, will coil itſelf round in the neſt.

The

Plate.98.



The Eſculapian Serpent *p.279.*



The Rattle Snake *with its Rattles p.275.*

The whole of this tribe are oviparous, laying eighty or an hundred eggs at a time, in dung-hills or hot-beds; the heat of which, aided by that of the ſun, brings them to maturity. During winter they lie torpid, in banks of hedges, and under old trees.

THE BLIND WORM is another harmleſs reptile, with a formidable appearance. The uſual length of this ſpecies is eleven inches. The eyes are red, the head ſmall, the neck ſtill more ſlender; from that part the body grows ſuddenly, and continues of an equal bulk to the tail, which ends quite blunt. The colour of the back is cinereous, marked with very ſmall lines, compoſed of minute black ſpecks. The motion of this ſerpent is ſlow; from which, and from the ſmallneſs of the eyes, are derived its names; ſome calling it the ſlow, and ſome the blind worm. Like all the reſt of the kind, in our climates, they lie torpid during winter, and are ſometimes found, in vaſt numbers, twiſted together. This animal, like the former, is perfectly innocent; like the viper, however, it brings forth its young alive.

The AMPHISBÆNA, or the double-headed ſerpent, is remarkable for moving along with either the head or the tail foremoſt: whence it has been thought to have two heads. Some have affirmed that its bite is dangerous; but this muſt be a miſtake, as it wants the fangs, and conſequently the elaboratory that prepares the poiſon.

The ESCULAPIAN SERPENT of Italy (See pl. XCVIII.) is among this number. It is there ſuffered to crawl about the chambers, and often gets into the beds where people lie. It is a yellow ſerpent, of about an ell long; and, though innocent, yet will bite when exaſperated. They are ſaid to be great deſtroyers of mice; and this may be the reaſon why they are taken under human protection. The BOYUNA of Ceylon is equally a favourite among the natives; and they conſider the meeting it as a ſign of good luck. The SURINAM SERPENT, which ſome improperly call the Ammodytes, is equally harmleſs and deſirable among the ſavages of that part of the world. They conſider themſelves as extremely happy, if this animal comes into their huts. The colours of this ſerpent are ſo many and beautiful, that they ſurpaſs all deſcription; and theſe, perhaps, are the chief inducements to the ſavages, to conſider its viſits as ſo very fortunate. A ſtill greater favourite is the PRINCE of SERPENTS, a native of Japan, that has not its equal for beauty. The ſcales which cover the back are reddiſh, finely ſhaded, and marbled with large ſpots of irregular figures mixed with black. The fore part of the head is covered with large, beautiful ſcales; the jaws bordered with yellow; the forehead marked with a black marbled ſtreak, and the eyes handſome and lively. But the GERENDA of the Eaſt Indies is the moſt honoured and eſteemed. To this animal, which is finely ſpotted with various colours, the natives of Calicut pay divine honours; and, while their deity lies coiled up, which is its uſual poſture, the people fall upon their faces before it, with ſtupid adoration. The African Gerenda is larger, and worſhiped in the ſame manner, by the inhabitants of the coaſts of Mozambique.

But, in the larger tribe of ſerpents, there is nothing but danger to be apprehended. This formidable claſs, though without venom, have ſomething frightful in their colour, as well as their ſize and form. They want that vivid hue, with which the ſavages are ſo much pleaſed in the leſſer kinds. They are all found of a duſky colour, with large teeth, which are more formidable than dangerous.

The firſt of this claſs is the great JIBOYA of Java and Brazil, which Leguat affirms, he has ſeen fifty feet long. The largeſt animal of this kind, which has been brought into Europe, is but thirty-ſix feet long; and it is probable, that much greater have been ſeen and deſtroyed, before they were thought worth ſending ſo far, to ſatisfy European curioſity. The moſt uſual length, however, of the jiboya, is about twenty feet, and the thickneſs in proportion. The teeth are ſmall in proportion to the body; nor are they uſed, but when it ſeizes the ſmalleſt prey.

THE BOIGUACU is ſuppoſed to be the next in magnitude, and has often been ſeen to ſwallow a goat whole. It is thickeſt in the middle of the body, and grows ſmaller towards the head and the tail. It has a double row of ſharp teeth in each jaw, ſhining like mother-of-pearl. The head is broad, and over the eyes it is raiſed into two prominences: near the extremity of the tail there are two claws, reſembling thoſe of birds.

Theſe ſerpents lie hid in thickets, whence they ſally out unawares, and raiſing themſelves upright on their tails, will attack both men and beaſts. They make a loud hiſſing noiſe when exaſperated; and ſometimes winding up trees, will dart down upon travellers, and twiſt themſelves ſo cloſely round their bodies, as to diſpatch them in a very few minutes.

To this claſs of large ſerpents, we may refer the DEPONA, a native of Mexico, with a very large head, and great jaws. The mouth is armed with cutting, crooked teeth, among which there are two longer than the reſt, placed in the fore part of the upper jaw, but very different from the fangs of the viper. All round the mouth there is a broad, ſcaly border; and the eyes are ſo large, that they give it a very terrible aſpect. The forehead is covered with very large ſcales, on which are placed others, that are ſmaller, curiouſly ranged: thoſe on the back are greyiſh. Each ſide of the belly is marbled with large ſquare ſpots, of a cheſnut colour; in the middle of which is a ſpot, which is round and yellow. They avoid the ſight of man; and, conſequently, never do much harm.

CHAP. XXXV.

Of Inſects in general—Inſects without Wings—The SPIDER *—Houſe, Garden, Wandering, Field, and Martinico Spiders—The Water Spider—The Tarantula—The* FLEA *—The* LOUSE*—The Leaf Louſe—The* BUG*—The* WOOD LOUSE*—The* WATER FLEA*—The* SCORPION*—The* CENTIPES*—The Gallyworm—The* LEECH.

OF all animated beings, man offers the moſt wonderful variety in his internal conformation; quadrupeds come next; and other animals follow in proportion to their powers or their excellencies. Inſects ſeem above all others the moſt imperfectly formed; from their minuteneſs, the diſſecting knife can go but a ſhort way in the inveſtigation; but one thing argues an evident imperfection; which is, that many of them can live a long time, though deprived of thoſe organs which are neceſſary to life in the higher ranks of nature.

Many of them are furniſhed with lungs and a heart like nobler animals; yet the caterpillar continues to live, though its heart and lungs, which is often the caſe, are entirely eaten away.

If inſects be conſidered as bearing a relation to man, and as aſſiſting him in the pleaſures or neceſſities of life, they will, even in this reſpect, ſink in the compariſon with the larger tribes of nature. It is true, that the bee, the ſilk-worm, the cochineal fly, and the cantharides, render him ſignal ſervices; but how many others of this claſs, are either noxious, or totally unſerviceable to him. Even in theſe countries, where all the noxious animals have been reduced by repeated aſſiduity, the inſect tribes ſtill maintain their ground, and are but too often unwelcome intruders upon the fruits of human induſtry. But, in more uncultivated regions, their annoyance and devaſtations are terrible. What an uncomfortable life muſt the natives lead in Lapland, and ſome parts of America, where, if a candle be lighted, the inſects ſwarm in ſuch abundance, as inſtantly to extinguiſh it with their numbers; where the inhabitants are obliged to ſmear their bodies and faces with tar, or ſome other compoſition, to protect them from the puncture of their minute enemies; where, though millions are deſtroyed, famiſhed millions are ſtill ſeen to ſucceed, and to make the torture endleſs!

Yet, while we are thus fixing the rank of a certain claſs of animals, it ſeems neceſſary to define the nature of thoſe animals which are thus degraded. Definitions, in general, produce little knowledge; but here, where the ſhades of nature are ſo intimately blended, ſome diſcrimination is neceſſary to prevent confuſion. The ſmallneſs of the animal, for inſtance, does not conſtitute an inſect; for then, many of the lizard kind, which are not above two inches long, would come under this denomination; and if the ſmaller lizards, why not the crocodile, which would be a terrible inſect indeed? In the ſame manner, ſmallneſs, with a ſlow, creeping motion, does not conſtitute an inſect; for, though ſnails might be called inſects with ſome propriety, the whole tribe of ſea ſhell-fiſh would then have equal pretenſions, and a very troubleſome innovation would be brought into our language, which is already formed. Excluding ſuch animals, therefore, from the inſect tribe, we may define inſects to be *little animals without red blood, bones or cartilages, furniſhed with a trunk, or elſe a mouth,* *opening lengthwiſe, with eyes which they are incapable of covering, and with lungs which have their openings on the ſides.* This definition comprehends the whole claſs of inſects, whether with or without wings, whether in their caterpillar or butterfly ſtate, whether produced in the ordinary method of generation between male and female, or from an animal that is itſelf both male and female, or from the ſame animal cut into ſeveral parts, and each part producing a perfect animal.

In a curſory inſpection of the inſect tribe, the firſt animals that offer themſelves are thoſe which want wings, that appear crawling about on every plant, and on every ſpot of earth which we regard with any degree of attention. Thoſe therefore that never have wings, but creep about till they die, may be conſidered as conſtituting the firſt claſs of inſects. All theſe, the flea and the wood-louſe only excepted, are produced from an egg; and, when once they break the ſhell, they never ſuffer any further change of form, but continue to grow larger 'till they die. The ſecond order of inſects conſiſts of ſuch as have wings; but which, when produced from the egg, have thoſe wings caſed up in ſuch a manner as not to appear. The third order of inſects is of the moth and butterfly kind. The fourth order is of thoſe winged inſects which come from a worm, inſtead of a caterpillar, and yet go through changes ſimilar to thoſe which moths and butterflies are ſeen to undergo. To theſe we add, as a fifth order, a numerous tribe lately diſcovered, to which naturaliſts have given the name of Zoophytes. Theſe do not go through the ordinary forms of generation, but may be propagated by diſſection. They ſeem a ſet of creatures placed between animals and vegetables, and make the ſhade that connects animated and inſenſible nature.

Of Inſects without Wings.

If we conſider this claſs as diſtinct from others, we ſhall find them in general longer lived than the reſt, and often continuing their term beyond one ſeaſon, which is the ordinary period of an inſect's exiſtence. They ſeem alſo leſs ſubject to the influence of the weather; and often endure the rigours of winter without being numbed into torpidity. The whole race of moths, butterflies, bees, and flies, are rendered lifeleſs by the return of cold weather; but we need not be told, that the louſe, the flea, and many of theſe wingleſs creatures that ſeem formed to teize mankind, continue their painful depredations the whole year round.

They come to perfection in the egg, and it ſometimes happens, that when the animal is interrupted in performing the offices of excluſion, the young ones burſt the ſhell within the parent's body, and are thus brought forth alive. This not unfrequently happens with the wood-louſe, and others of the kind, which are ſometimes ſeen producing eggs, and ſometimes young ones perfectly formed.

Though theſe creatures are perfect from the beginning, yet they are often, during their exiſtence, ſeen to change their ſkin: this is a faculty which they poſſeſs in common with many of the higher ranks of animals, and which anſwers the ſame purpoſes. However tender their ſkins may ſeem to our feel, yet, if compared to the animal's ſtrength and ſize, they will be found to reſemble a coat of mail or, to talk more cloſely, the ſhell of a lobſter. By this ſkin theſe animals are defended from accidental injuries, and particularly from the attacks of each other, within this they continue to grow, till their bodies become ſo large as to be impriſoned in their own covering, and then the ſhell burſts, but is quickly replaced by a new one.

Laſtly, theſe animals are endued with a degree of ſtrength for their ſize, that at firſt might exceed credibility. —Had man an equal degree of ſtrength, bulk for bulk, with a louſe or flea, the hiſtory of Sampſon would be no longer miraculous.—A flea will draw a chain an hundred times heavier than itſelf; and to compenſate for this force, will eat ten times its own ſize of proviſion in a ſingle day.

THE SPIDER (See pl. XCIX.) The animal that deſerves our firſt notice in this principal order of inſects is the ſpider, whoſe manners are the moſt ſubtle, and whoſe inſtincts are moſt various. Formed for a life of rapacity, and incapable of living upon any other than inſect food, all its habits are calculated to deceive and ſurprize; it ſpreads toils to entangle its prey; it is endued with patience to expect its coming; and is poſſeſſed of arms and ſtrength to deſtroy it when fallen into the ſnare.

In theſe countries, where all the inſect tribes are kept under by human aſſiduity, the ſpiders are but ſmall and harmleſs. We are acquainted with few but the *houſe-ſpider*, which weaves its web in neglected rooms; the *garden-ſpider*, that ſpeads it toils from tree to tree; and reſts in the centre; the *wandering-ſpider*, that has no abode like the reſt; and the *field-ſpider*, which is ſometimes ſeen mounting, web and all, into the clouds. Theſe are the chief of our native ſpiders; which, though reputed venomous, are entirely inoffenſive. But they form a much more terrible tribe in Africa and America. In fact, the bottom of the *Martinico ſpider's* body is as large as a hen's egg, and covered all over with hair. Its web is ſtrong, and its bite dangerous.

Every ſpider has two diviſions in its body. The fore part, containing the head and breaſt, is ſeparated from the hinder part or belly by a very ſlender thread, through which, however, there is a communication from one part to the other. The fore part is covered with a hard ſhell, as well as the legs, which adhere to the breaſt. The hinder part is clothed with a ſupple ſkin, beſet all over with hair. They have ſeveral eyes all round the head, brilliant and acute; theſe are ſometimes eight in number, ſometimes but ſix; two behind, two before, and the reſt on each ſide. Like all other inſects, their eyes are immoveable; and they want eye-lids; but this organ is fortified with a tranſparent horny ſubſtance, which at once ſecures and aſſiſts their viſion. As the animal procures its ſubſiſtence by the moſt watchful attention, ſo large a number of eyes was neceſſary to give it the earlieſt information of the capture of its prey. They have two pincers on the fore-part of the head, rough, with ſtrong points, toothed like a ſaw, and terminating in claws like thoſe of a cat. A little below the point of the claw there is a ſmall hole, through which the animal emits a poiſon, which, though harmleſs to us, is ſufficiently capable of inſtantly deſtroying its prey. This is the moſt powerful weapon they have againſt their enemies; they can open or extend theſe pincers as occaſion may require; and when they are undiſturbed, they ſuffer them to lie one upon the other, never opening them but when there is a neceſſity for their exertion. They have all eight legs, jointed like thoſe of lobſters, and ſimilar alſo in another reſpect; for if a leg be torn away, or a joint cut off, a new one will quickly grow in its place, and the animal will find itſelf fitted for combat as before. At the end of each leg there are three crooked moveable claws; namely, a ſmall one, placed higher up, like a cock's ſpur, by the aſſiſtance of which it adheres to the threads of its web. There are two others larger, which meet together like a lobſter's claw, by which they can catch hold of the ſmalleſt depreſſions, walking up or down the very poliſhed ſurfaces, on which they can find inequalities that are imperceptible to our groſſer ſight. But when they walk upon ſuch bodies as are perfectly ſmooth, as looking-glaſs or poliſhed marble, they ſqueeze a little ſponge, which grows near the extremity of their claws, and thus diffuſing a glutinous ſubſtance, adhere to the ſurface until they make a ſecond ſtep. Beſides the eight legs juſt mentioned, theſe animals have two others, which may more properly be called arms, as they do not ſerve to aſſiſt motion, but are uſed in holding and managing their prey.

The ſpider, though thus formidably equipped, would ſeldom prove ſucceſsful in the capture, were it not equally furniſhed with other inſtruments to aſſiſt its depredations. It is a moſt experienced hunter, and ſpreads it nets to catch ſuch animals as it is unable to purſue. The ſpider's web is generally laid in thoſe places where flies are moſt apt to ſhelter. There the little animal remains for days, nay weeks together, in patient expectation, ſeldom changing its ſituation though ever ſo unſucceſsful.

For the purpoſes of making this web, Nature has ſupplied this animal with a large quantity of glutinous matter, and five dugs or teats for ſpinning it into thread. This ſubſtance is contained in a little bag, and at firſt ſight it reſembles ſoft glue; but when examined more accurately, it will be found twiſted into many coils of an agate colour, and upon breaking it, the contents may be eaſily drawn out into threads, from the tenacity of the ſubſtance, not from thoſe threads being already formed. Thoſe who have ſeen the machine by which wire is ſpun, will have an idea of the manner in which this animal forms the threads of its little net, the orifices of the five teats above mentioned, through which the thread is drawn, contracting or dilating at pleaſure. The threads which we ſee, and appear ſo fine, are, notwithſtanding, compoſed of five joined together, and theſe are many times doubled when the web is in formation.

When a *houſe-ſpider* propoſes to begin a web, it firſt makes choice of ſome commodious ſpot, where there is an appearance of plunder and ſecurity. The animal then diſtils one little drop of its glutinous liquor which is very tenacious, and then creeping up the wall, and joining its thread as it proceeds, it darts itſelf in a very ſurpriſing manner,

ner, to the oppoſite place, where the other end of the web is to be faſtened. The firſt thread thus formed, drawn tight, and fixed at each end, the ſpider then runs upon it backward and forward, ſtill aſſiduouſly employed in doubling and ſtrengthening it, as upon its force depends the ſtrength and ſtability of the whole. The ſcaffolding thus completed, the ſpider makes a number of threads parallel to the firſt, in the ſame manner, and then croſſes them with others; the clammy ſubſtance of which they are formed, ſerving to bind them, when newly made, to each other.

The inſect after this operation, doubles and trebles the thread that borders its web, by opening all its teats at once, and ſecures the edges, ſo as to prevent the wind from blowing the work away. The edges being thus fortified, the retreat is next to be attended to; and this is formed like a funnel at the bottom of the web, where the little creature lies concealed. To this are two paſſages, or outlets, one above and the other below, very artfully contrived, to give it an opportunity of making excurſions at proper ſeaſons, of prying into every corner, and cleaning thoſe parts which are obſerved to be clogged or encumbered. Still attentive to its web, the ſpider, from time to time, cleans away the duſt that gathers round it, which might otherwiſe clog and incommode it: for this purpoſe, it gives the whole a ſhake with its paws; ſtill, however, proportioning the blow ſo as not to endanger the fabric. It often happens alſo, that from the main web there are ſeveral threads extended at ſome diſtance on every ſide: theſe are, in ſome meaſure, the outworks of the fortification, which, whenever touched from without, the ſpider prepares for attack or ſelf-defence. If the inſect impinging be a fly, it ſprings forward with great agility; if, on the contrary, it be the aſſault of an enemy ſtronger than itſelf, it keeps within its fortreſs, and never ventures out till the danger be over. Another advantage which the ſpider reaps from this contrivance of a cell, or retreat behind the web, is, that its ſerves for a place where the creature can feaſt upon its game with all ſafety, and conceal the fragments of thoſe carcaſſes which it has picked, without expoſing to public view the leaſt trace of barbarity, that might create a ſuſpicion in any inſects that their enemy was near.

It often happens, however, that the wind, or the ſhaking of the ſupporters, or the approach of ſome large animal, deſtroys in a minute the labours of an age. In this caſe the ſpider is obliged to remain a patient ſpectator of the univerſal ruin; and when the danger is paſſed away, it ſets about repairing the calamity. In general, the animal is much fonder of mending than making, as it is furniſhed originally with but a certain quantity of glutinous matter, which, when exhauſted, nothing can renew. The time ſeldom fails to come, when their reſervoirs are entirely dried up, and the poor animal is left to all the chances of irretrievable neceſſity. An old ſpider is thus frequently reduced to the greateſt extremity; its web is deſtroyed, and it wants the materials to make a new one. But as it has been long accuſtomed to a life of ſhifting, it hunts about to find out the web of another ſpider, younger and weaker than itſelf, with whom it ventures a battle. The invader generally ſucceeds; the young one is driven out to make a new web, and the old one remains in quiet poſſeſſion. If, however, the ſpider is unable to diſpoſſeſs any other of its web, it then endeavours, for a while, to ſubſiſt upon accidental depredation; but in two or three months it inevitably dies of hunger.

The *garden-ſpider* ſeems to work in a different manner. The method with this inſect is to ſpin a great quantity of thread, which floating in the air in various directions, happens from its glutinous quality, at laſt to ſtick to ſome object near it, a lofty plant or the branch of a tree. The ſpider only wants to have one end of the line faſt, in order to ſecure and tighten the other. It accordingly draws the line when thus fixed, and then by paſſing and repaſſing upon it, ſtrengthens the thread in ſuch a manner as to anſwer all its intentions. The firſt cord being thus ſtretched, the ſpider walks along a part of it, and there faſtens another, and dropping thence, faſtens the thread to ſome ſolid body below, then climbs up again and begins a third, which it faſtens by the ſame contrivance. When three threads are thus fixed, it forms a ſquare or ſomething that very nearly reſembles one; and in this the animal is generally ſeen to reſide. It often happens, however, when the young ſpider begins ſpinning, that its web becomes too buoyant, and not only the thread floats in the air, but even the little ſpinſter. In this manner we have often ſeen the threads of ſpiders floating in the air; and what is ſtill more ſurpriſing, the young ſpiders themſelves attached to their own web.

The ſpider's web being completed, and fixed in a proper place, its next care is to ſeize and ſecure whatever inſect happens to be caught in the toil. For this purpoſe, it remains for weeks and even months upon the watch, without ever catching a ſingle fly; for the ſpider, like moſt other inſects, is ſurpriſingly patient of hunger. It ſometimes happens that too ſtrong a fly ſtrikes itſelf againſt the web, and thus, inſtead of being caught, tears the net to pieces. In general, however, the butterfly or the hornet, when they touch the web, fly off again, and the ſpider ſeems no way diſpoſed to interrupt their retreat. The large blue-bottle-fly, the ichneumon-fly, and the common meat-fly, ſeem to be its favourite game. When one of theſe ſtrike into the toils, the ſpider is inſtantly ſeen alert and watchful at the mouth of its hole, careful to obſerve whether the fly be completely ſecured. If that be the caſe, the ſpider walks leiſurely forward, ſeizes its prey, and inſtantly kills it by inſtilling a venomous juice into the wound it makes. If, however, the fly be not faſt, the ſpider patiently waits, without appearing until its prey has fatigued itſelf by its ſtruggles to obtain its liberty; for if the ravager ſhould appear in all is terrors while the prey is but half involved, a deſperate effort might give it force enough to get free. If the ſpider has faſted for a long time, it then drags the fly immediately into its hole and devours it; but if there has been plenty of game, and the animal be no way preſſed by hunger, it then gives the fly two or three turns in its web, ſo as completely to ſecure it, and there leaves it impotently to ſtruggle until the little tyrant comes to its appetite.

It has been the opinion of ſome philoſophers, that the ſpider was in itſelf both male and female; but Liſter has been able to diſtinguiſh the ſexes, and to perceive that the males were much leſs in ſize than the females.

The female generally lays from nine hundred to a thouſand eggs in a ſeaſon. Theſe eggs are large or ſmall in proportion to the ſize of the animal that produces them. In ſome they are as large as a grain of muſtard-ſeed; in others, they are ſcarcely viſible. The female never begins to lay till ſhe is two years old.

When the number of eggs which the ſpider has brought forth have remained for an hour or two to dry after excluſion, the little animal then prepares to make them a bag, where they are to be hatched until they leave the ſhell. For this purpoſe, ſhe ſpins a web four or five times ſtronger than that made for catching flies; and, beſides, lines it within ſide by a down, which ſhe plucks from her own breaſt. This bag, when completed, is as thick as paper, is ſmooth within ſide, but rougher without. Within this they depoſit their eggs; and it is almoſt incredible to relate the concern and induſtry which they beſtow in the preſervation of it. They ſtick it by means of their glutinous fluid to the end of their body; ſo that the animal, when thus loaded, appears as if ſhe had one body placed behind another. If this bag be ſeparated from her by any accident, ſhe employs all her aſſiduity to ſtick it again in its former ſituation, and ſeldom abandons her treaſure but with her life. When the young ones are excluded from their ſhells, within the bag, they remain for ſome time in their confinement, until the female, inſtinctively knowing their maturity, bites open their priſon, and ſets them free. But her parental care does not terminate with their excluſion; ſhe receives them upon her back for ſome time, until they have ſtrength to provide for themſelves, when they leave her never to return, and each begins a ſeparate manufactory of its own. The young ones begin to ſpin when they can ſcarcely be diſcerned; and prepare for a life of plunder before they have ſtrength to overcome.

Thus there is no inſect to which they are not enemies, but what is more barbarous ſtill, ſpiders are the enemies of each other. Mr. Reaumur, who was fond of making experiments upon inſects, tried to turn the labours of the ſpider to human advantage, and actually made a pair of gloves from their webs. For this purpoſe, he collected a large number of thoſe inſects together: he took care to have them conſtantly ſupplied with flies, and the ends of young feathers, freſh picked from chickens and pigeons, which being full of blood, are a diet that ſpiders are particularly fond of. But notwithſtanding all his care, he was ſoon convinced that it was impracticable to rear them, ſince they were of ſuch a malignant nature, that they could never be brought to live in ſociety; but inſtead of their uſual food, choſe to devour each other. Indeed, were it practicable to reconcile them to each other, it would require too much attendance to rear up a ſufficient number to make the project any way uſeful. Their thread is four, if not five times finer than that of the ſilk-worm; ſo that upon the ſmalleſt calculation, there muſt have been ſixty thouſand ſpiders to make a ſingle pound of ſilk. That which Reaumur made uſe of, was only the web in which they depoſited their eggs, which is five times ſtronger than their ordinary manufacture.

Of this animal, there are ſeveral kinds, ſlightly differing from each other, either in habits or conformation. The

Water-ſpider is the moſt remarkable of the number. This inſect reſembles the common ſpider in its appearance, except that its hinder part is made rather in the ſhape of a nine-pin than a ball. They differ in being able to live as well by land as water; and in being capable of ſpinning as well in one element as the other. Their appearance under water is very remarkable; for though they inhabit the bottom, yet they are never touched by the element in which they reſide, but are encloſed in a bubble of air that, like a box, ſurrounds them on every ſide. This bubble has the bright appearance, at the bottom, of quickſilver; and within this, they perform their ſeveral functions of eating, ſpinning and ſleeping, without its ever burſting, or in the leaſt diſturbing their operations.

The *Tarantula* is alſo of this ſpecies, and deſerves particular notice, only for the numerous falſehoods which have been propagated concerning it. What may be ſaid with truth concerning it is, that it is the largeſt of the ſpider kind known in Europe, and is a native of Apulia in Italy. Its body is three quarters of an inch long, and about as thick as one's little finger; the colour is generally an olive brown, variegated with one that is more duſky; it has eight legs and eight eyes, like the reſt, and nippers, which are ſharp and ſerrated; between theſe and the fore legs, there are two little horns, or feelers, which it is obſerved to move very briſkly when it approaches its prey. It is covered all over the body with a ſoft down; and propagates, as other ſpiders, by laying eggs. In the ſummer months, particularly in the dog days, the tarantula creeping among the corn, bites the mowers and paſſengers; but in winter, it lurks in holes, and is ſeldom ſeen.

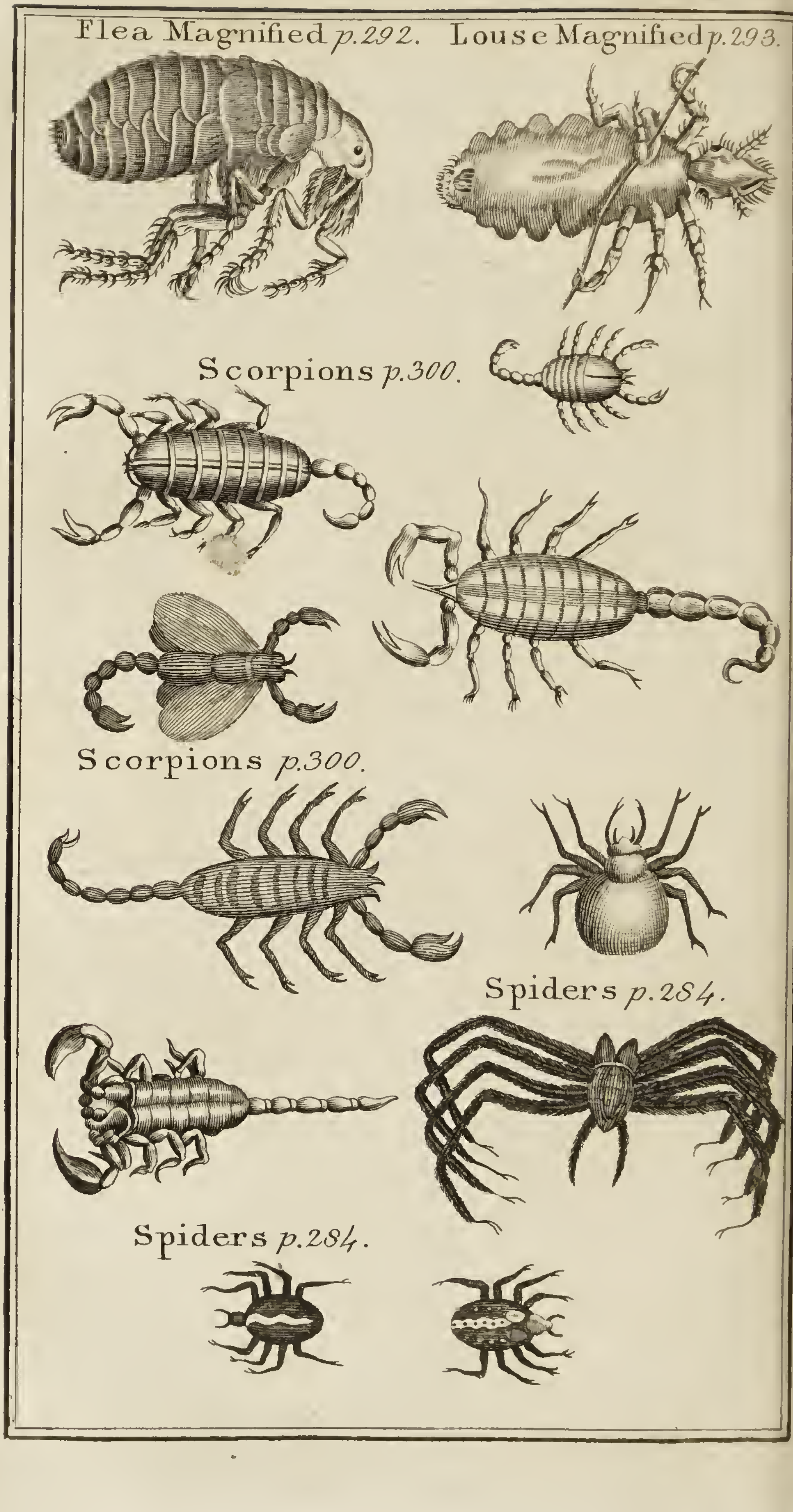
Thus far is true; but now the fable begins: for though the bite is attended with no dangerous ſymptoms, and will eaſily cure of itſelf, wonderful ſtories are reported concerning its virulence. At firſt the pain is ſcarcely felt; but a few hours after, a violent ſickneſs is ſaid to come on, with difficulty of breathing, fainting, and ſometimes trembling. The perſon bit, after this does nothing but laugh, dance and ſkip about, putting himſelf into the moſt extravagant poſtures; and ſometimes alſo is ſeized with a moſt frightful melancholy. At the return of the ſeaſon in which he was bit, his madneſs begins again; and the patient always talks of the ſame things. Sometimes he fancies himſelf a ſhepherd; ſometimes a king; theſe troubleſome ſymptoms ſometimes return for ſeveral years ſucceſſively,

ceſſively, and at laſt terminate in death. But ſo dreadful a diſorder has it ſeems not been left without a remedy; which is no other than a well played fiddle. For this purpoſe the medical muſician plays a particular tune, famous for the cure, which he begins ſlow, and encreaſes in quickneſs as he ſees the patient affected. The patient no ſooner hears the muſic, but he begins to dance; and continues ſo doing till he is all over in a ſweat, which forces out the venom that appeared ſo dangerous. Such are the ſymptoms related of the tarantula poiſon; but the truth is, that the whole is an impoſition of the peaſants upon travellers who happen to paſs through that part of the country, and who procure a trifle for ſuffering themſelves to be bitten by the tarantula. Whenever they find a traveller willing to try the experiment, they readily offer themſelves; and are ſure to counterfeit the whole train of ſymptoms which muſic is ſaid to remove. It is thus that falſehoods prevail for a century or two; and mankind at laſt begin to wonder how it was poſſible to keep up the deluſion ſo long.

THE FLEA (See pl. XCIX.) The hiſtory of thoſe animals with which we are beſt acquainted, is one of the firſt objects of our curioſity. If the flea be examined with a microſcope, it will be obſerved to have a ſmall head, large eyes, and a roundiſh body. It has two feelers, or horns, which are ſhort, and compoſed of four joints; and between theſe lies its trunk, which it buries in the ſkin, and through which it ſucks the blood in large quantities. The body appears to be all over curiouſly adorned with a ſuit of poliſhed ſable armour, neatly jointed, and beſet with multitudes of ſharp pins, almoſt like the quills of a porcupine. It has ſix legs, the joints of which are ſo adapted, that it can, as it were, fold them up one within another; and when it leaps, they all ſpring out at once, whereby its whole ſtrength is exerted, and the body raiſed above two hundred times its own diameter.

The young fleas are at firſt a ſort of nits or eggs, which are round and ſmooth; and from theſe proceed white worms, of a ſhining pearl colour: in a fortnight's time they come to a tolerable ſize, and are very lively and active; but if they are touched at this time, they roll themſelves up in a ball: ſoon after this they begin to creep like ſilk-worms that have no legs; and then they ſeek a place to lie hid in, where they ſpin a ſilken thread from their mouth, and with this they encloſe themſelves in a

Plate. 99.


Flea Magnified p.292.
Louse Magnified p.293.
Scorpions p.300.
Scorpions p.300.
Spiders p.284.
Spiders p.284.

ſmall round bag or caſe, as white within as writing paper, but dirty without: in this they continue for a fortnight longer; after which they burſt from their confinement perfectly formed, and armed with powers to diſturb the peace of an emperor.

OF THE LOUSE.] In examining the *human louſe* (See pl. XCIX.) with the microſcope, its external deformity firſt ſtrikes us with diſguſt: the ſhape of the fore part of the head is ſomewhat oblong; that of the hind part ſomewhat round: the ſkin is hard, and being ſtretched, tranſparent, with here and there ſeveral briſtly hairs: in the fore part is a proboſcis or ſucker, which is ſeldom viſible: on each ſide of the head are antennæ, or horns, each divided into five joints, covered with briſtly hair; and ſeveral white veſſels are ſeen through theſe horns: behind theſe are the eyes, which ſeem to want thoſe diviſions obſervable in other inſects, and appear encompaſſed with ſome few hairs: the neck is very ſhort, and the breaſt is divided into three parts: on each ſide of which are placed ſix legs, conſiſting of ſix joints covered alſo with briſtly hairs: the ends of the legs are armed with two ſmaller and larger ruddy claws, ſerving thoſe inſects as a finger and thumb, by which they catch hold of ſuch objects as they approach: the end of the body terminates in a cloven tail, while the ſides are all over hairy; the whole reſembling clear parchment, and, when roughly preſſed, cracking with a noiſe.

When we take a cloſer view, its white veins, and other internal parts appear; as likewiſe a moſt wonderful motion in its inteſtines, from the tranſparency of its external covering. When the louſe feeds, the blood is ſeen to ruſh, like a torrent, into the ſtomach; and its greedineſs is ſo great, that the excrements contained in the inteſtines are ejected at the ſame time, to make room for this new ſupply.

The louſe has neither beak, teeth, nor any kind of mouth. In the place of all theſe, it has a proboſcis or trunk; or, as it may be otherwiſe called, a pointed hollow ſucker, with which it pierces the ſkin, and ſucks the human blood, taking that for food only. The ſtomach is lodged partly in the breaſt and back; but the greateſt portion of it is in the abdomen. When it is empty, it is colourleſs; but when filled, it is plainly diſcernible, and its motion ſeems very extraordinary. It then appears working with very ſtrong agitations, and ſomewhat reſembles an animal within an animal. Superficial obſervers are apt to take this for the pulſation of the heart; but if the animal be obſerved when it is ſucking, it will then be found that the food takes a direct paſſage from the trunk to the ſtomach, where the remainder of the old aliment will be ſeen mixing with the new, and agitated up and down on every ſide.

If this animal be kept from food two or three days, and then placed upon the back of the hand, or any ſoft part of the body, it will immediately ſeek for food; which it will the more readily find, if the hand be rubbed till it grows red. The animal then turns its head, which lies between the two fore legs, to the ſkin, and diligently ſearches for ſome pore: when found, it fixes the trunk therein; and ſoon the microſcope diſcovers the blood aſcending through the head, in a very rapid, and even frightful ſtream. The louſe has at that time ſufficient appetite to feed in any poſture; it is then ſeen ſucking with its head downward, and its tail elevated. If, during this operation, the ſkin be drawn tight, the trunk is bound faſt, and the animal is incapable of diſengaging itſelf; but it more frequently ſuffers from its gluttony, ſince it gorges to ſuch a degree, that it is cruſhed to pieces by the ſlighteſt impreſſion.

There is ſcarcly any animal that multiplies ſo faſt as this unwelcome intruder. It has been pleaſantly ſaid, that a louſe becomes a grand-father in the ſpace of twenty-four hours: this fact cannot be aſcertained; but nothing is more true than, that the moment the nit, which is no other than the egg of the louſe, gets rid of its ſuperfluous moiſture, and throws off its ſhell, it then begins to breed in its turn. Nothing ſo much prevents the encreaſe of this nauſeous animal, as cold and want of humidity; the nits muſt be laid in a place that is warm, and moderately moiſt, to produce any thing. This is the reaſon that many nits laid on the hairs in the night-time, are deſtroyed by the cold of the ſucceeding day; and ſo ſtick for ſeveral months, till they at laſt come to loſe even their external form.

There is ſcarce an animal, and ſcarce even a vegetable, that does not ſuffer under its own peculiar louſe. The ſheep, the horſe, the hog, and the elephant, are all teized by them; the whale, the ſhark, the ſalmon, and the lobſter, are not without their company; while every hot-houſe, and every garden is infeſted with ſome peculiarly deſtructive. Linnæus tells us, that he once found a vegetable-louſe upon ſome plants newly arrived from America; and willing to trace the little animal through it various ſtages, he brought it with him from London to Leyden, where he carefully preſerved it during the winter, until it bred in the ſpring: but the louſe it ſeems did not treat him with all the gratitude he expected: for it became the parent of ſo numerous a progeny, that it ſoon overrun all the phyſic-garden of that beautiful city; and leaves, to this day, many a gardener to curſe the Swede's too indulgent curioſity.

The animal which ſome have called the *Leaf Louſe*, is of the ſize of a flea, and of a bright green, or bluiſh green colour; the body is nearly oval, and is largeſt and moſt convex on the hinder part; the breaſt is very ſmall, and the head is blunt and green; the eyes may be ſeen very plainly, being prominent on the fore part of the head, and of a ſhining black colour; near theſe there is a black line on each ſide; and the legs are very ſlender.

Theſe animals are uſually found upon the leaves of the orache, and other plants; and the weaker the leaves and buds are, theſe inſects ſwarm upon them in greater abundance. Some plants are covered over with them; though they are not the cauſe of the plant's weakneſs, but the ſign: however, by wounding and ſucking the leaf, they increaſe the diſeaſe. They generally aſſume their colour from the plant on which they reſide. Thoſe that feed upon pot-herbs and plum trees, are of an aſh-colour; only they are greeniſh when they are young: thoſe that belong to the alder and cherry-tree, are black; as alſo thoſe upon beans, and ſome other plants: thoſe on the leaves of apples and roſe-trees, are white: but as they leap, like graſshoppers, ſome place them in the number of the flea kind. The moſt uncommon colour is reddiſh; and lice of this ſort may be found on the leaves of tanſey; and their juice, when rubbed in the hands, tinges them with no diſagreeable red. All theſe live upon their reſpective plant; and are often engendered within the very ſubſtance of the leaf.

All theſe bring forth their young alive; and the fœtus, when it is ready to be brought forth, entirely fills the belly of the female; its fore parts being excluded firſt, and then the hinder. The young one does not begin to move till the horns or feelers appear out of the body of the old one; and by the motion of theſe it firſt ſhews ſigns of life, moving them in every direction, and bending all their joints. When the horns and head are excluded, the two fore feet follow, which they move with equal agility; after this follow the middle feet, and then the hinder: ſtill, however, the young one continues ſticking to its parent, ſupported only at one extremity, and hanging as it were in air, until its ſmall and ſoft members become hardened and fitted for ſelf-ſupport. The parent then gets rid of its burthen; by moving from the place where ſhe was ſitting, and forcing the young one to ſtand upon it legs, leaves it to ſhift for itſelf.

As the animal has not far to go, its proviſion lying beneath it, during the ſummer it continues to eat and creep about with great agility. But as it is viviparous, and muſt neceſſarily lurk ſomewhere in winter, where its body may be defended from the cold, it endeavours to ſecure a retreat near the trees or plants that ſerve to nouriſh it in the beginning of ſpring. They never hide themſelves in the earth, like many other inſects, becauſe they have no part of their bodies fitted to remove the earth; nor can they creep into every chink, as their legs are too long: beſides, their bodies are ſo tender, that the leaſt rough particle of the earth would hurt them. They therefore get into the deep chinks of the bark, and into the cavities of the ſtronger ſtalks, whence they ſally out upon the branches and leaves, when the warmth of the ſun begins to be felt. Neither the cold in the autumnal ſeaſon, nor the leſſer degree of heat in the ſpring, ever hurts them; they ſeldom, therefore, ſeek for hiding-places before the fall of the leaf, and are alert enough to take the earlieſt advantage of the returning ſpring.

Like many other inſects, they caſt their ſkins four ſeveral times; and, what is very remarkable, the males have four wings, but the females never have any. They all have long legs, not only to enable them to creep over the long hairs of plants and leaves, but alſo to travel from one tree to another, when they happen to ſtand at a diſtance. Their trunk or ſnout lies under their breaſt; and this they thruſt into the pores of the plant to ſuck out the juice, for they do not gnaw them, like the caterpillar; but ſo hurt them by ſucking, that the leaves become ſpotted, and as it were overrun with ſcabs; for which reaſon their edges always turn up towards the middle.

It has been ſaid, that theſe inſects are often carried away and devoured by ants; but this Fryſch, from whom this deſcription is taken, could never obſerve. The ants indeed are fond of thoſe trees where there is a great number of thoſe inſects; but then it is only to ſuck the juice which flows from the leaves that have been juſt wounded. This more particularly happens in the heat of ſummer, when other moiſture is wanting: however, he never found them hurting or carrying away any of theſe inſects while alive; nor indeed were they able, for the leaf louſe is more than a match for the ant at ſingle combat. Whenever they perceive the ant approaching behind them, they kick back with their hinder feet, and thus drive off the invader, as a horſe would a lion.

The three principal and conſtant enemies to theſe inſects are firſt, the fire-fly, which lays its eggs where theſe inſects are in greateſt number, which producing a worm, ſeizes and devours all the leaf-lice that come near it: another enemy is the worm of a peculiar kind of beetle, which deſtroys them in great numbers: but the moſt formidable of all enemies, is the ichneumon fly, that ſeizes upon one of the largeſt females, and laying its egg upon her, this is hatched into a worm, which ſoon devours and deſtroys the animal from whoſe body it ſprung.

The Bug is another of thoſe nauſeous inſects that intrude upon the retreats of mankind; and often baniſh that ſleep, which even ſorrow and anxiety permitted to approach. This, to many men, is of all inſects, the moſt troubleſome and obnoxious. The night is uſually the ſeaſon when the wretched have reſt from their labour; but this ſeems the only ſeaſon when the bug iſſues from its retreats, to make its depredations. By day it lurks, like a robber, in the moſt ſecret parts of the bed; takes the advantage of every chink and cranny, to make a ſecure lodgment; and contrives its habitation with ſo much art, that ſcarce any induſtry can diſcover its retreat. It ſeems to avoid the light with great cunning; and even if candles be kept burning, this formidable inſect will not iſſue from its hiding place. But, when darkneſs promiſes ſecurity, it then iſſues from every corner of the bed, drops from the teſter, crawls from behind the arras, and travels, with great aſſiduity, to the unhappy patient, who vainly wiſhes for reſt and refreſhment. It is generally vain to deſtroy one only, as there are hundreds more to revenge their companion's fate; ſo that the perſon who thus is ſubject to be bitten, remains the whole night, like a centinel upon duty, rather watching the approach of freſh invaders, than inviting the pleaſing approaches of ſleep.

Nor are theſe inſects leſs diſagreeable from their nauſeous ſtench, than their unceaſing appetites. When they begin to crawl, the whole bed is infected with the ſmell; but if they are accidentally killed, then it is inſupportable.

Theſe are a part of the inconveniences that reſult from the perſecution of theſe odious inſects: but, happily for Great Britain, they multiply leſs in that iſland, than in any part of the continent. In France and Italy, the beds, particularly in their inns, ſwarm with them; and every piece of furniture ſeems to afford them a retreat. They grow larger alſo with them than in England, and bite with more cruel appetite.

This animal, if examined minutely, appears to conſiſt of three principal parts; the head, the corſelet, and the belly. It has two brown eyes, that are very ſmall, and a little prominent, beſides two feelers, with three joints: underneath theſe, there is a crooked trunk, which is its inſtrument of torture, and which, when in motion, lies cloſe upon the breaſt. The breaſt is a kind of ring, in which are placed the two firſt pairs of legs. The belly conſiſts of nine rings; under which are placed two pair of legs more, making ſix in all. Each leg has three joints, which form the thigh, the leg, and the foot, which is armed with a crooked claw, like an hook. The body is ſmooth, except a few ſhort hairs, that may be ſeen by the microſcope, about the vent, and on the two laſt rings. Its ſight is ſo exquiſite, that the inſtant it perceives the light, it generally makes good its retreat; and they are ſeldom caught, though the bed ſwarms with them.

Cleanlineſs ſeems to be the beſt antidote to remove theſe nauſeous inſects; and wherever that is wanting, their increaſe ſeems but a juſt puniſhment. Indeed, they are ſometimes found in ſuch numbers among old furniture, and neglected chambers, expoſed to the ſouth, that, wanting other ſuſtenance, they devour each other. They are alſo enemies to other vermin, and deſtroy fleas very effectually; ſo that we ſeldom have the double perſecution of different vermin in the ſame bed. Of the bug kind Linnæus reckons up forty.

The common Wood-louse is ſeldom above half an inch long, and a quarter of an inch broad. The colour is of a livid black, eſpecially when found about dung-hills, and on the ground; but thoſe that are to be met with under tiles, and in drier places, are of the colour of the hair of an aſs. It has fourteen feet, ſeven on each ſide; and they have only one joint each, which is ſcarcely perceivable. It has two ſhort feelers, and the body is of an oval ſhape. When it is touched, it rolls itſelf up in a ſort of a ball; and the ſides, near the feet, are dentated, like a ſaw. It is often found among rotten timber, and on decayed trees: in winter it lies hid in the crevices of walls, and all ſorts of buildings. The male is eaſily diſtinguiſhable from the female, being leſs, and more ſlender. The eggs they lay are white and ſhining, like ſeed pearls, and are very numerous; more properly ſpeaking, however, when excluded, the young have all the appearance of an egg, yet they are alive, and, without throwing off any ſhell, ſtir and move about with great vivacity; ſo that this animal may properly be ſaid to be viviparous. The little worms at firſt ſeem ſcarcely able to ſtir; but they ſoon feed, and become very briſk. Of this inſect Linnæus makes three ſpecies.

THE MONOCULUS, OR ARBORESCENT WATER-FLEA.] This animal, which is of the ſize of a flea, appears to the ſight, unaſſiſted by the microſcope, to have but one eye; for the eyes, by reaſon of the ſmallneſs of the head, ſeem to be joined to each other: they are ſituated in the trunk of this inſect, and the beak is likewiſe very ſmall and ſharp pointed. The ſtructure of the eye is ſeen by the microſcope, to be reticulated, or made like a net; and the trunk of this inſect, by which it feeds, is not only ſmall and ſharp, but alſo tranſparent. The inſects are of a blood red colour; and ſometimes are ſeen in ſuch multitudes on the ſurface of ſtanding water, as to make it appear all over red, whence many fanciful people have thought the water to be turned into blood.

Of all parts of this animal, its branching arms, and the motion it makes with them in the water, deſerve our greateſt attention. By theſe the little creature can move in a ſtraight line; waving its arms, as a bird does its wings in the air, ſometimes upward, ſometimes downward, ſometimes to the right, ſometimes to the left, yet ſtill continuing to proceed in a right line. By ſtriking the water with its arms, it can aſcend with great velocity; and by ſtriking in a contrary direction, it dives with equal eaſe. As theſe motions are very rapid, the little animal appears to jump in the water, its head always tending to the ſurface, and its tail ſtretched downward. This inſect is produced from an egg, which, when excluded, is carried on the bak of the female, and ſoon is ſeen floating in the water round her. Its appearance at firſt is that of a very ſmall whitiſh inſect, endued with a very nimble motion. Except in colour, it ſuffers no change, only continuing to grow larger and redder, as it grows old. They ſometimes remain ſeveral days on the ſurface of the water; and ſometimes are ſeen at the bottom only; but they are never at reſt. They change their ſkin, like moſt other inſects; and the caſt ſkin reſembles the inſect itſelf ſo exactly, that one might miſtake the maſk for the animal.

The Scorpion (See pl. XCIX.) There is ſcarcely an inſect without wings that is not obnoxious to man: the ſmalleſt have the power of annoying him, either by biting or ſtinging him; and though each is in itſelf contemptible, they become formidable from their numbers. But of all this claſs, there is none ſo terrible as the ſcorpion, whoſe ſhape is hideous, whoſe ſize among the inſect tribe is enormous, and whoſe ſting is generally fatal.

The ſcorpion is one of the largeſt of the inſect tribe, and not leſs terrible from its ſize than its malignity. It reſembles a lobſter ſomewhat in ſhape, but is infinitely more hideous. There have been enumerated nine different kinds of this dangerous inſect, chiefly diſtinguiſhed by their colour: there being ſcorpions yellow, brown, and aſh-coloured; others that are the colour of ruſty iron, green, pale yellow, black, claret colour, white, and grey.

There are four principal parts diſtinguiſhable in this animal; the head, the breaſt, the belly, and the tail. The ſcorpion's head ſeems, as it were, jointed to the breaſt; in the middle of which are ſeen two eyes; and a little more forward, two eyes more, placed in the fore part of the head: theſe eyes are ſo ſmall, that they are ſcarcely perceivable; and it is probable the animal has but little occaſion for ſeeing. The mouth is furniſhed with two jaws; the undermoſt is divided into two, and the parts notched into each other, which ſerves the animal as teeth, and with which it breaks its food, and thruſts it into its mouth: theſe the ſcorpion can at pleaſure pull back into its mouth, ſo that no part of them can be ſeen. On each ſide of the head are two arms, each compoſed of four joints; the laſt of which is large, with ſtrong muſcles, and made in the manner of a lobſter's claw. Below the breaſt are eight articulated legs, each divided into ſix joints; the two hindmoſt of which are each provided with two crooked claws, and here and there covered with hair. The belly is divided into ſeven little rings; from the loweſt of which is continued a tail, compoſed of ſix joints, which are briſtly, and formed like little globes, the laſt being armed with a crooked ſting. This is that fatal inſtrument which renders this inſect ſo formidable: it is long, pointed, hard and hollow; it is pierced near the baſe by two ſmall holes, through which, when the animal ſtings, it ejects a drop of poiſon, which is white, cauſtic, and fatal. The reſervoir in which this poiſon is kept, is in a ſmall bladder near the tail, into which the venom is diſtilled by a peculiar apparatus. If this bladder be gently preſſed, the venom will be ſeen iſſuing out through the two holes above-mentioned; ſo that it appears, that when the animal ſtings, the bladder is preſſed, and the venom iſſues through the two apertures into the wound.

There are few animals more formidable, or more truly miſchievous than the ſcorpion. As it takes refuge in a ſmall place, and is generally found ſheltering in houſes, ſo it cannot be otherwiſe than that it muſt frequently ſting thoſe among whom it reſides. In ſome of the towns of Italy, and in France, in the province of Languedoc, it is one of the greateſt peſts that torment mankind: but its malignity in Europe is trifling, when compared to what the natives of Africa and the Eaſt, are known to experience. In Batavia, where they grow twelve inches long, there is no removing any piece of furniture, without the utmoſt danger of being ſtung by them.

Boſman aſſures us, that, along the Gold Coaſt, they are often found larger than a lobſter; and that their ſting is inevitably fatal. In Europe, the general ſize of this animal does not exceed two or three inches; and its ſting is very ſeldom found to be fatal. Maupertuis, who made ſeveral experiments on the ſcorpion of Languedoc, found it by no means ſo invariably dangerous as it had till then been repreſented.

From his experiments, indeed, it appears, that many circumſtances, which are utterly unknown, muſt contribute to give efficacy to the ſcorpion's venom; but whether its food, long faſting, the ſeaſon, the nature of the veſſels it wounds, or its ſtate of maturity, contribute to, or retard its malignity, is yet to be aſcertained by ſucceeding obſervers.

The ſcorpion of the tropical climates being much larger than the former, is probably much more venomous. Helbigius, however, who reſided for many years in the Eaſt, aſſures us, that he was often ſtung by the ſcorpion, and never received any material injury from the wound: a painful tumour generally enſued; but he always cured it, by rubbing the part with a piece of iron or ſtone, as he had ſeen the Indians practiſe before him, until the fleſh became inſenſible. Seba, Moore, and Boſman, however, give a very different account of the ſcorpion's malignity; and aſſert that, unleſs ſpeedily relieved, the wound becomes fatal.

It is certain, that no animal in the creation ſeems endued with ſuch an iraſcible nature.

Wolkamer tried the courage of the ſcorpion againſt the large ſpider, and encloſed ſeveral of both kinds in glaſs veſſels, for that purpoſe *. The ſucceſs of this combat was very remarkable. The ſpider at firſt uſed all its efforts to immeſh the ſcorpion in its web, which it immediately began ſpinning; but the ſcorpion reſcued itſelf from the danger, by ſtinging its adverſary to death: it ſoon after cut off, with its claws, all the legs of the ſpider, and then ſucked all the internal parts at its leiſure.—If the ſcorpion's ſkin had not been ſo hard, Wolkamer is of opinion, that the ſpider would have obtained the victory; for he had often ſeen one of theſe ſpiders deſtroy a toad.

The fierce ſpirit of this animal is equally dangerous to its own ſpecies; for ſcorpions are the cruelleſt enemies to each other. Maupertuis put about an hundred of them together in the ſame glaſs; and they ſcarcely came into contact, when they began to exert all their rage in mutual deſtruction: there was nothing to be ſeen but one univerſal carnage, without any diſtinction of age or ſex; ſo that, in a few days, there remained only fourteen, which had killed and devoured all the reſt.

But their unnatural malignity is ſtill more apparent, in their cruelty to their offspring. He encloſed a female ſcorpion, big with young, in a glaſs veſſel, and ſhe was ſeen to devour them as faſt as they were excluded; there was but one only of the number that eſcaped the general deſtruction, by taking refuge on the back of its parent; and this ſoon after revenged the cauſe of its brethren, by killing the old one in its turn.

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* Ephemerides, Dec. ii, 1687. Obſerv. 224.

Were it worth the trouble, theſe animals might be kept living as long as curioſity ſhould think proper. Their chief food is worms and inſects; and, upon a proper ſupply of theſe, their lives might be lengthened to their natural extent. How long that may be we are not told; but if we may argue from analogy, it cannot be leſs than ſeven or eight years; and, perhaps, in the larger kind, double that duration. As they have ſomewhat the form of the lobſter, ſo they reſemble that animal in caſting their ſhell, or, more properly, their ſkin; ſince it is ſofter by far than the covering of the lobſter, and ſet with hairs, which grow from it in great abundance, particularly at the joinings. The young lie in the womb of the parent, each covered up in its own membrane, to the number of forty or fifty, and united to each other by an oblong thread, ſo as to exhibit altogether the form of a chaplet.

There is, however, a ſcorpion of America, produced from the egg, in the manner of the ſpider. The eggs are no larger than pins points; and they are depoſited in a web, which they ſpin from their bodies, and carry about with them, till they are hatched. As ſoon as the young ones are excluded from the ſhell, they get upon the back of the parent, who turns her tail over them, and defends them with her ſting. It ſeems probable, therefore, that captivity produces that unnatural diſpoſition in the ſcorpion, which induces it to deſtroy its young; ſince, at liberty, it is found to protect them with ſuch unceaſing aſſiduity.

THE SCOLOPENDRA AND GALLY-WORM.] Of theſe hideous and angry inſects we know little, except the figure and the noxious qualities. Though with us there are inſects ſomewhat reſembling them in form, we are placed at an happy diſtance from ſuch as are really formidable. With us they ſeldom grow above an inch long; in the tropical climates they are often found above a quarter of a yard.

The *Scolopendra* is otherwiſe called the *Centipes*, from the number of its feet; and it is very common in many parts of the world, eſpecially between the tropics. Thoſe of the Eaſt Indies, where they grow to the largeſt ſize, are about ſix inches long, of a ruddy colour, and as thick as a man's finger: they conſiſt of many joints; and from each joint is a leg on each ſide; they are covered with hair, and ſeem to have no eyes; but there are two feelers on the head, which they make uſe of to find out the way they are to paſs: the head is very round, with two ſmall ſharp teeth, with which they inflict wounds that are very painful and dangerous. A ſailor that was bit by one on board a ſhip, felt an exceſſive pain, and his life was ſuppoſed to be in danger: however, he recovered, by the application of three roaſted onions to the part; and was ſoon quite well. Of this animal there are different kinds; ſome living, like worms, in holes in the earth; others under ſtones, and among rotten wood: ſo that nothing is more dangerous than removing thoſe ſubſtances, in the places where they breed.

The *Gally-worm* differs from the ſcolopendra, in having double the number of feet; there being two on each ſide, to every joint of the body. Some of theſe are ſmooth, and others hairy; ſome are yellow, ſome black, and ſome brown. They are found among decayed trees, between the wood and the bark; as alſo among ſtones that are covered with moſs. They all, when touched, contract themſelves, rolling themſelves up like a ball. Whatever may be their qualities in the tropical parts of the world, in Europe they are perfectly harmleſs; having been often handled and irritated, without any vindictive conſequences.

All theſe, as well as the ſcorpion, are ſuppoſed to be produced perfect from the parent, or the egg; and to undergo no changes, after their firſt excluſion. They are ſeen of all ſizes; and this is a ſufficient inducement to ſuppoſe, that they preſerve their firſt appearance, through the whole of their exiſtence. It is probable, however, that, like moſt of this claſs, they often change their ſkins; but of this we have no certain information.

The Leech, from its uſes in medicine, is one of thoſe inſects that man has taken care to propagate; but of a great variety, one kind only is conſidered as ſerviceable. The horſe-leech, which is the largeſt of all, and grows to four inches in length, with a gloſſy black ſurface, is of no uſe, as it will not ſtick to the ſkin; the *ſnail-leech* is but an inch in length; and though it will ſtick, is not large enough to extract a ſufficient quantity of blood from the patient; the *broad-tailed* leech, which grows to an inch and an half in length, with the back raiſed into a ſort of a ridge, will ſtick but on very few occaſions; it is the large *brown* leech with a whitiſh belly, that is made uſe of in medicine, and whoſe hiſtory beſt merits our curioſity.

The leech has the general figure of a worm, and is about as long as one's middle finger. Its ſkin is compoſed of rings, by means of which it is poſſeſſed of its agility, and ſwims in water. It contracts itſelf, when out of water, in ſuch a manner, that when touched, it is not above an inch long. It has a ſmall head, and a black ſkin, edged with a yellow line on each ſide, with ſome yellowiſh ſpots on the back. The belly alſo, which is of a reddiſh colour, is marked with whitiſh yellow ſpots. But the moſt remarkable part of this animal is the mouth, which is compoſed of two lips, that take whatever form the inſect finds convenient. When at reſt, the opening is uſually triangular; and within it are placed three very ſharp teeth, capable of piercing not only the human ſkin, but alſo that of an horſe or an ox. Still deeper in the head, is diſcovered the tongue, which is compoſed of a ſtrong fleſhy ſubſtance, and which ſerves to aſſiſt the animal in ſucking, when it has inflicted its triple wound; for no ſooner is this voracious creature applied to the ſkin, than it buries its teeth therein, then cloſes its lips round the wound which it has made; and thus, in the manner of a cupping-glaſs, extracts the blood as it flows to the different orifices.

In examining this animal's form farther towards the tail, it is ſeen to have a gullet, and an inteſtinal canal, into which the blood flows in great abundance. On each ſide of this are ſeen running along ſeveral little bladders, which, when the animal is empty, ſeem to be filled with nothing but water; but when it is gorging blood, they ſeem to communicate with the inteſtines, and receive a large portion of the blood which flows into the body. If theſe bladders ſhould be conſidered as ſo many ſtomachs, then every leech will be found to have twenty-four. But what is moſt extraordinary of all in this animal's formation is, that though it takes ſo large a quantity of food, it has no anus or paſſage to eject it from the body when it has been digeſted. On the contrary, the blood which the leech has thus ſucked, remains for ſeveral months clotted within its body, blackened a little by the change, but no way putrefied, and very little altered in its texture or conſiſtence. In what manner it paſſes through the animal's body, or how it contributes to its nouriſhment, is not eaſily accounted for. The water in which they are kept is very little diſcoloured by their continuance; they cannot be ſuppoſed to return the blood by the ſame paſſage through which it was taken in; it only remains, therefore, that it goes off through the pores of the body, and that theſe are ſufficiently large to permit its excluſion.

But it is not in this inſtance alone that the leech differs from all other inſects. It was remarked in a former ſection, that the whole inſect tribe had their opening into their lungs placed in their ſides; and that they breathed through thoſe apertures as other animals through the mouth. A drop of oil poured on the ſides of a waſp, a bee, or a worm, would quickly ſuffocate them, by ſtopping up the paſſages through which they breathe; but it is otherwiſe with the leech, for this animal may be immerſed in oil without injury; nay, it will live therein; and the only damage it will ſuſtain is, that when taken out it will be ſeen to caſt a fine pellucid ſkin, exactly of the ſhape of the animal, after which it is as alert and vigorous as before. It appears from this, that the leach breathes through the mouth; and, in fact, it has a motion that ſeems to reſemble the act of reſpiration in more perfect animals: but concerning all this we are very much in the dark.

The leech is viviparous, and produces its young one after the other, to the number of forty or fifty at a birth. It is probable, that, like the ſnail, each inſect contains the two ſexes, and that it impregnates, and is impregnated in the ſame manner. The young ones are chiefly found in the month of July, in ſhallow running waters, and particularly where they are tepified by the rays of the ſun. The large ones are chiefly ſought after; and being put into a glaſs veſſel filled with water, they remain for months, nay for years, without taking any other ſubſiſtence. But they never breed in this confinement; and, conſequently, what regards that part of their hiſtory ſtill remains obſcure.

In this part of the world they ſeldom grow to above four inches; but in America and the Eaſt they are found from ſix to ſeven. Their pools there abound with them in ſuch numbers, that it would be dangerous bathing there, if for no other conſideration. Our ſailors and ſoldiers, who the laſt war were obliged to walk in thoſe countries through marſhy grounds, talk with terror of the number of leeches that infeſted them on their march. Even in ſome parts of Europe they increaſe ſo as to become formidable. Sedelius, a German phyſician, relates, that a girl of nine years old, who was keeping ſheep near the city of Bomſt, in

Poland, perceiving a ſoldier making up to her, went to hide herſelf in a neighbouring marſh, among ſome buſhes; but the number of leeches was ſo great in that place, and they ſtuck to her ſo cloſe, that the poor creature expired from the quantity of blood which ſhe loſt by their united efforts. Nor is this much to be wondered at, ſince one of thoſe inſects, that, when empty, generally weighs but a ſcruple, will, when gorged, weigh more than two drachms.

When leeches are to be applied, be beſt way is to take them from the water in which they are contained, about an hour before, for they thus become more voracious, and faſten more readily. When ſaturated with blood, they generally fall off of themſelves; but if it be thought neceſſary to take them from the wound, care ſhould be uſed to pull them very gently, or even to ſprinkle them with ſalt, if they continue to adhere; for if they be plucked rudely away, it moſt frequently happens that they leave their teeth in the wound, which makes a very troubleſome inflammation, and is often attended with danger. If they be ſlow in fixing to the part, they are often enticed by rubbing it with milk or blood, or water mixed with ſugar. As ſalt is a poiſon to moſt inſects, many people throw it upon the leech when it has dropped from the wound, by which means it diſgorges the blood it has ſwallowed, and it is then kept for repeated application. They ſeldom, however, ſtick after this operation; and as the price is but ſmall, freſh leeches ſhould always be applied whenever ſuch an application is thought neceſſary.

CHAP. XXXVI.

The Second Order of Inſects—The DRAGON FLY—*The* LION ANT—*The* GRASSHOPPER—*The Locuſt—The Great Weſt Indian Locuſt—The Houſe Cricket—The Wood Cricket—The Mole Cricket—The* EARWIG—*The Froth Worm—The Water Fly—The Water Scorpion—The* EPHEMERA.

WE come now to a ſecond order of inſects, that are produced from the egg, like the former, but not in a perfect ſtate; for, when firſt excluded, they are without wings.

To this order, we may, in the firſt place, refer the LIBELLA, or DRAGON-FLY.

Of all the flies which adorn or diverſify the face of Nature, theſe are the moſt various and the moſt beautiful; they are of all colours; green, blue, crimſon, ſcarlet, white, &c.

They are diſtinguiſhed from all other flies by the length of their bodies, by the largeneſs of their eyes, and the beautiful tranſparency of their wings, which are four in number. They are ſeen in ſummer flying with great rapidity near every hedge, and by every running brook; they ſometimes ſettle on the leaves of plants, and ſometimes keep for hours together on the wing.

Dragon-flies, though there are three or four different kinds, yet agree in the moſt ſtriking parts of their hiſtory, and one account may ſerve for all. The largeſt ſort are generally found from two to three inches long; their tail is forked; their body divided into eleven rings; their eyes are large, horny, and tranſparent, divided by a number of interſections; and their wings, that always lie flat when they are at reſt, are of a beautiful gloſſy tranſparency; ſometimes ſhining like ſilver, and ſometimes gliſtening like gold. Within the mouth are to be ſeen two teeth, covered with a beautiful lip: with theſe the creatures bite fiercely when they are taken; but their bite is perfectly harmleſs.

Theſe inſects, beautiful as they are, are produced from eggs, which are depoſited in the water, where they remain for ſome time without ſeeming life or motion. They are ejected by the female into the water in cluſters, like a bunch of grapes, where they ſink to the bottom by their natural weight, and continue in that ſtate till the young ones find ſtrength enough to break the ſhell, and to ſeparate from each other. The form in which they firſt ſhew life is that of a worm with ſix legs, bearing a ſtrong reſemblance to the dragon-fly in its winged ſtate, except that the wings are yet concealed within a ſheath peculiar to this animal. The rudiments of theſe appear in bunches on the back, within which the wings are folded up into each other, while all the colours and varieties of painting appear tranſparent through the ſkin. Theſe animals, upon quitting the egg, ſtill continue in the water, where they creep and ſwim, but do not move ſwiftly. They have likewiſe a ſharp ſight, and immediately ſink to the bottom, if any one comes to the places wherein they live, or whenever they perceive the leaſt uncommon object. Their food at that time is ſoft mud and the glutinous earthy ſubſtances that are found at the bottom.

When theſe animals prepare to change from their reptile to their flying ſtate, they then move out of the water to a dry place; as into graſs; to pieces of wood, ſtone, or any thing elſe they meet with. They there firmly fix their acute claws; and, for a ſhort time, continue quite immoveable, as if meditating on the change they are to undergo. It is then obſerved, that the ſkin firſt opens on the head and back; and out of this opening they exhibit their real head and eyes, and at length their ſix legs; whilſt, in the mean time, the hollow and empty ſkin, or ſlough of their legs, remains firmly fixed in its place. After this, the creature creeps forward by degrees; and by this means draws firſt its wings and then its body out of the ſkin; and proceeding a little farther, ſits at reſt for ſome time, as if immoveable. During this time the wings, which were moiſt and folded, begin by degrees to expand themſelves, and to make ſmooth and even all thoſe plaits which were laid againſt each other, like a cloſed fan. The body is likewiſe inſenſibly extended, until all the limbs have obtained their proper ſize and dimenſions.

No animal is more amply fitted for motion, ſubſiſtence, and enjoyment. As it haunts and ſeeks after its food flying in the air, Nature has provided it with two large eyes, which make almoſt the whole head, and which reſemble glittering mother-of-pearl.

As the wings are long, and the legs ſhort, they ſeldom walk, but are ever ſeen either reſting or flying.

Thus they are ſeen, adorning the ſummer with a profuſion of beauty, lightly traverſing the air in a thouſand directions, and expanding the moſt beautiful colours to the ſun. The garden, the foreſt, the hedges, and the rivulets, are animated by their ſports; and there are few who have been brought up in the country, who have not employed a part of their childhood in the purſuit.

But while theſe beautiful flies appear to us ſo idly and innocently employed, they are in fact the greateſt tyrants of the inſect tribe; and, like the hawk among birds, are only hovering up and down to ſeize their prey. They are the ſtrongeſt and the moſt courageous of all winged inſects; nor is there one, how large ſoever, that they will not attack and devour. The blue fly, the bee, the waſp, and the hornet, make their conſtant prey; and even the butterfly, that ſpreads ſo large a wing, is often caught and treated without mercy. Their appetite ſeems to know no bounds; they ſpend the whole day in the purſuit, and have been ſeen to devour three times their own ſize in the capture of a ſingle hour. They ſeize their prey flying, with their ſix claws, and tear it eaſily to pieces with their teeth, which are capable of inflicting troubleſome wounds.

The Lion Ant.] Although this animal properly belongs to no order of inſects, yet, as it is changed into a fly very much reſembling that deſcribed in the preceding chapter, it may not be improper to give its hiſtory here.

The lion-ant, in its reptile ſtate, is of the ſize of a common wood-louſe, but ſomewhat broader. It has a pretty long head, and a roundiſh body, which becomes a little narrower towards the tail. The colour is a dirty grey, ſpeckled with black, and the body is compoſed of ſeveral flat rings, which ſlip one upon another. It has ſix feet, four of which are fixed to the breaſt, and two to the neck. The head is ſmall and flat, and before there are two little ſmooth horns and feelers, which are hard, about a quarter of an inch long, and crooked at the ends. At the baſis of the feelers there are two ſmall black lively eyes, by which it can ſee the ſmalleſt object, as is eaſily diſcovered by its ſtarting from every thing that approaches.

To a form ſo unpromiſing, and ſo ill provided for the purpoſes of rapacity, this animal unites the moſt ravenous appetites in nature; but to mark its imbecility ſtill ſtronger, as other animals have wings or feet to enable them to advance towards their prey, the lion-ant is unprovided with ſuch aſſiſtance from either. It has legs, indeed; but theſe only enable it to run backward, ſo that it could as ſoon die as make the ſmalleſt progreſſive motion. Thus, famiſhed and rapacious as it ever ſeems, its prey muſt come to it, or rather into the ſnare provided for it, or the inſidious aſſaſſin muſt ſtarve.

But Nature, that has denied it ſtrength or ſwiftneſs, has given it an equivalent in cunning, ſo that no animal fares more ſumptuouſly, without ever ſtirring from its retreat. For this purpoſe, it chooſes a dry ſandy place, at the foot of a wall, or under ſome ſhelter, in order to preſerve its machinations from the rain. The drieſt and moſt ſandy ſpot is the moſt proper for it; becauſe a heavy clogged earth would defeat its labour. When it goes about to dig the hole where it takes its prey, it begins to bend the hinder part of its body, which is pointed, and thus works backward; making, after ſeveral attempts, a circular furrow, which ſerves to mark out the ſize of the hole it intends making, as the ancients marked out the limits of a city with the plough. Within this firſt furrow it digs a ſecond, then a third, and afterwards others, which are always leſs than the preceding. Then it begins to deepen its hole, ſinking lower and lower into the ſand, which it throws with its horns, or feelers, towards the edges, as we ſee men throw up ſand in a gravel-pit. Thus, by repeating its labours all round, the ſand is thrown up in a circle about the edge of the pit, until the whole is quite completed. This hole is always formed in a perfect circle; and the pit itſelf reſembles the inſide of a inverted funnel.

The work being thus with great labour finiſhed, the inſidious inſect places itſelf in ambuſh, hiding itſelf in the bottom under the ſand in ſuch a manner, that its two horns encircle the bottom of the pit. All the ſides of this pit-fall are made of the moſt looſe and crumbling materials; ſo that ſcarcely any inſect can climb up that has once got down to the bottom. Conſcious of this, the lion-ant remains in patient expectation, ready to profit by that accident which throws ſome heedleſs little animal into his den. If then, by misfortune, an ant, a wood-louſe, or a ſmall caterpillar, walks too near the edge of the precipice, the ſand gives way beneath them, and they fall to the bottom of the pit, where they meet inevitable deſtruction. The fall of a ſingle grain of ſand gives the murderer notice at the bottom of its cave; and it never fails to ſally forth to ſeize upon its prey. It happens ſometimes, however, that the ant or the wood-louſe is too nimble, and runs up the ſides of the pit-fall before the other can make ready to ſeize it. The lion-ant has then another contrivance, ſtill more wonderful than the former; for, by means of its broad head and feelers, it has a method of throwing up a ſhower of ſand, which falls upon the ſtruggling captive with tremendous weight, and once more cruſhes it down to the bottom.

When the prey is reduced to a huſk, and nothing but the external form remains, the next care of the murderer is to remove the body from its cell; he, therefore, takes up the waſted trunk with its feelers, and throws it, with wonderful ſtrength, at leaſt ſix inches from the edge of its hole; and then patiently ſets about mending the breaches which its fortifications had received in the laſt engagement.

When the lion-ant attains a certain age, in which it is to change into another form, it then leaves off its uſual rapacious habits.

Theſe animals are produced in autumn, and generally live a year, and perhaps two, before they aſſume a winged form.

When the time of change approaches, if the inſect finds its little cell convenient, it ſeeks no other: if it is obliged to remove, after furrowing up the ſand, it hides itſelf under it, horns and all. It there ſpins a thread, in the manner of the ſpider; which being made of a glutinous ſubſtance, and being humid from the moiſture of its body, ſticks to the little particles of ſand among which it is ſpun; and in proportion as it is thus excluded, the inſect rolls up its web, ſand and all, into a ball, of which itſelf is the center. This ball is about half an inch in diameter; and within it the inſect reſides, in an apartment ſufficiently ſpacious for all its motions. The outſide is compoſed of ſand and ſilk; the inſide is lined with ſilk only, of a fine pearl colour, extremely delicate, and perfectly beautiful. But though the work is ſo curious within, it exhibits nothing to external appearance, but a lump of ſand; and thus eſcapes the ſearch of birds, that might otherwiſe diſturb the inhabitant within.

The inſect continues thus ſhut up for ſix weeks or two months; and gradually parts with its eyes, its feelers, its feet, and its ſkin; all which are thruſt into a corner of the inner apartment, like a rag. The inſect then appears almoſt in its winged ſtate, except that there is a thin ſkin which wraps up the wings, and which appears to be nothing elſe but a liquor dried on their outſide. Still, however, the little animal is too delicate and tender to venture from its retreat; but continues encloſed for ſome time longer: at length, when the members of this new inſect have acquired the neceſſary conſiſtence and vigour, it tears open its lodging, and breaks through its wall. For this purpoſe, it has two teeth, like thoſe of graſshoppers, with which it eats through, and enlarges the opening, till it gets out. Its body, which is turned like a ſcrew, takes up no more than the ſpace of a quarter of an inch; but when it is unfolded, it becomes half an inch in length; while its wings, that ſeemed to occupy the ſmalleſt ſpace, in two minutes time unfold, and become longer than the body. In ſhort, it becomes a large and beautiful fly, of the libellula kind, with a long, ſlender body, of a brown colour; a ſmall head, with large bright eyes, long ſlender legs, and four large, tranſparent, reticulated wings. The reſt of its habits reſemble that inſect whoſe form it bears; except, that inſtead of dropping its eggs in the water, it depoſits them in ſand, where they are ſoon hatched into that rapacious inſect, ſo juſtly admired for its method of catching its prey.

THE GRASSHOPPER, THE LOCUST, THE CRICKET, &c. (See pl. C.) That animal which is called the *Graſshopper* (See pl. C.) with us, differs greatly from the cicada of antiquity; for as our inſect is active enough in hopping through the long graſs, whence it has taken its name, the cicada had not this power, but either walked or flew. The little hiſſing note alſo of our graſshopper is very different from the ſong of the cicada, which was louder, and far more muſical.

Of this variegated tribe, the *little Graſshopper* that breeds in ſuch plenty in every meadow, and that continues its chirping through the ſummer, is beſt known to us; and, by having its hiſtory, we ſhall be poſſeſſed of that of all the reſt. This animal is of the colour of green leaves, except a line of brown which ſtreaks the back, and two pale lines under the belly, and behind the legs. It may be divided into the head, the corſelet, and the belly. The head is oblong, regarding the earth, and bearing ſome reſemblance to that of a horſe. Its mouth is covered by a kind of round buckler jutting over it, and armed with teeth of a brown colour, hooked at the points. Within the mouth is perceivable a large reddiſh tongue, and fixed to the lower jaw. The feelers, or horns, are very long, tapering off to a point; and the eyes are like two black ſpecks, a little prominent. The corſelet is elevated, narrow, armed above and below, by two ſerrated ſpines. The back is armed with a ſtrong buckler, to which the muſcles of the legs are firmly bound, and round theſe muſcles are ſeen the veſſels by which the animal breathes, as white as ſnow. The laſt pair of legs are much longer and ſtronger than the firſt two pair, fortified by thick muſcles, and very well formed for leaping. It has four wings; the anterior ones ſpringing from the ſecond pair of legs, the poſterior from the third pair. The hinder wings are much finer, and more expanſive, than the foremoſt, and are the principal inſtruments of its flight. The belly is conſiderably large, compoſed of eight rings, and terminated by a forky tail, covered with down, like the tail of a rat. When examined internally, beſides the gullet, we diſcover a ſmall ſtomach; and behind that a very large one, wrinkled and furrowed within ſide: lower down there is ſtill a third; ſo that it is not without reaſon, that all the animals of this order are ſaid to chew the cud, as they ſo much reſemble ruminant animals in their internal conformation.

A ſhort time after the graſshopper aſſumes its wings, it fills the meadow with its note; which, like that among birds, is a call to courtſhip. The male only of this tribe is vocal; and upon examining at the baſe of the wings, there will be found a little hole in its body, covered with a fine tranſparent membrane. This is thought, by Linnæus, to be the inſtrument it employs in ſinging; but others are of opinion, the ſound is produced by rubbing its hinder legs againſt each other: however this be, the note of one male is ſeldom heard, but it is returned by another; and the two little animals, after many mutual inſults of this kind, are ſeen to meet and fight deſperately. The female is generally the reward of victory; for, after the combat, the male ſeizes her with his teeth behind the neck, and thus keeps her for ſeveral hours.

Towards the latter end of autumn, the female prepares to depoſit her burthen; and her body is then ſeen greatly diſtended with her eggs, which ſhe carries to the number of an hundred and fifty. In order to make a proper lodgement in the earth for them, Nature has furniſhed her with an inſtrument at her tail, ſomewhat reſembling a two-edged ſword, which ſhe can ſheathe and unſheathe at pleaſure: with this ſhe pierces the earth as deep as ſhe is able; and into the hole which her inſtrument has made, ſhe depoſits her eggs, one after the other.

Having thus provided for the continuation of her poſterity, the animal herſelf does not long ſurvive; but, as the winter approaches, ſhe dries up, ſeems to feel the effects of age, and dies from a total decay. Some, however, aſſert, that ſhe is killed by the cold; and others, that ſhe is eaten by worms: but certain it is, that neither the male nor female are ever ſeen to ſurvive the winter. In the mean time, the eggs which have been depoſited continue unaltered, either by the ſeverity of the ſeaſon, or the retardation of the ſpring. They are of an oval figure, white, and of the conſiſtence of horn: their ſize nearly equals that of a grain of aniſe: they are enveloped in the body within a covering, branched all over with veins and arteries; and when excluded, they crack, on being preſſed between the fingers: their ſubſtance within is a whitiſh, viſcous, and tranſparent fluid.

Generally, about the beginning of May, every egg produces an inſect, about the ſize of a flea; theſe at firſt are of a whitiſh colour; at the end of two or three days they turn black; and ſoon after they become of a reddiſh brown. They appear, from the beginning, like graſshoppers wanting wings; and hop among the graſs, as ſoon as excluded, with great agility.

Yet ſtill they are by no means arrived at their ſtate of full perfection; although they bear a ſtrong reſemblance to the animal in its perfect form. They want, or ſeem to want, the wings, which they are at laſt ſeen to aſſume; and can only hop among the graſs, without being able to fly. The wings, however, are not wanting, but are concealed within four little bunches, that ſeem to deform the ſides of the animal: there they lie rolled up in a moſt curious manner; and occupying a ſmaller ſpace than one could conceive. Indeed, all inſects, whatever tranſmutations they ſeem to undergo, are yet brought forth with thoſe very limbs, parts, and wings, which they afterwards ſeem to acquire. In the moſt helpleſs caterpillar, there are ſtill to be ſeen the rudiments of that beautiful plumage which it afterwards expands when a butterfly; and though many new parts ſeem unfolded to the view, the animal acquires none but ſuch as it was from the beginning poſſeſſed of.

The graſshopper, that for above twenty days from its excluſion, has continued without the uſe of its wings, which were folded up to its body, at length prepares for its emancipation, and for a life of greater liberty and pleaſure. To make the proper diſpoſitions for the approaching change, it ceaſes from its graſſy food, and ſeeks about for a convenient place, beneath ſome thorn or thiſtle, that may protect it from an accidental ſhower. The ſame laborious writhings and workings, heavings and palpitations, which we have remarked in every other inſect upon an approaching change, are exhibited in this.

At length, the ſkin covering the head and breaſt, is ſeen dividing above the neck; the head is ſeen iſſuing out firſt from the burſting ſkin; the efforts ſtill continuing, the other parts follow ſucceſſively; ſo that the little animal, with its long feelers, legs and all, works its way from the old ſkin, that remains fixed to the thiſtle or the thorn. It is, indeed, inconceivable how the inſect can thus extricate itſelf from ſo exact a ſheath as that which covered every part of its body.

The graſshopper, thus diſengaged from its outer ſkin, appears in its perfect form; but then ſo feeble, and its body ſo ſoft and tender, that it may be molded like wax. It is no longer of that obſcure colour which it exhibited before, but a greeniſh white, which becomes more vivid as the moiſture on the ſurface is dried away. Still, however, the animal continues to ſhew no ſighs of life, but appears quite ſpent and fatigued with its labour for more than an hour together. During this time, the body is drying, and the wings unfolding to their greateſt expanſion; and the curious obſerver will perceive them, fold after fold, opening to the ſun, till at laſt they become longer than the two hinder legs. The inſect's body alſo is lengthened during this operation, and it becomes much more beautiful than before.

Theſe inſects are generally vocal in the midſt of ſummer; and they are heard at ſun-ſetting much louder than during the heats of the day. They are fed upon graſs; and, if their belly be preſſed, they will be ſeen to return the juices of the plants they have laſt fed upon. Though unwilling to fly, and ſlow in flight, particularly when the weather is moiſt or cool, they are ſometimes ſeen to fly to conſiderable diſtances. If they are caught by one of the hinder legs, they quickly diſengage themſelves from it, and leave the leg behing them. This, however, does not grow again, as with crabs or ſpiders; for as they are animals but of a ſingle year's continuance, they have not ſufficient time for repairing thoſe accidental misfortunes. The loſs of their leg alſo prevents them from flying; for, being unable to lift themſelves in the air, they have not room upon the ground for the proper expanſion of their wings. If they be handled roughly, they will bite very fiercely; and when they fly, they make a noiſe with their wings. They generally keep in the plain, where the graſs is luxuriant, and the ground rich and fertile: there they depoſit their eggs, particularly in thoſe cracks which are formed by the heat of the ſun.

Such are the habits and nature of thoſe little vocal inſects, that ſwarm in our meadows, and enliven the landſcape. The larger kinds only differ from them in ſize, in rapidity of flight, and the powers of injuring mankind, by ſwarming upon the productions of the earth. The quantity of graſs which a few graſshoppers that ſport in the fields can deſtroy is trifling; but when a ſwarm of *locuſts* (See pl. C.) two or three miles long, and ſeveral yards deep, ſettle upon a field, the conſequences are frightful. The annals of every country are marked with the devaſtation which ſuch a multitude of inſects produces; and though they ſeldom viſit Europe in ſuch dangerous ſwarms as formerly, yet, in ſome of the ſouthern kingdoms, they are ſtill formidable. Thoſe which have, at uncertain intervals, viſited Europe, in our memory, are ſuppoſed to have come from Africa, and the animal is called the Great Brown Locuſt. It was ſeen in ſeveral parts of England, in the year 1748, and many dreadful conſequences were apprehended from its appearance. This inſect is about three inches long; and has two horns or feelers, an inch in length. The head and horns are of a browniſh colour; it is blue about the mouth, as alſo on the inſide of the larger legs. The ſhield that covers the back is greeniſh; and the upper ſide of the body brown, ſpotted with black, and the under ſide purple. The upper wings are brown, with ſmall duſky ſpots, with one larger at the tips; the under wings are more tranſparent, and of a light brown, tinctured with green, but there is a dark cloud of ſpots near the tips.

There is no animal in the creation that multiplies ſo faſt as theſe, if the ſun be warm, and the ſoil in which their eggs are depoſited be dry.

The Scripture, which was written in a country where the locuſt made a diſtinguiſhed feature in the picture of Nature, has given us ſeveral very ſtriking images of this animal's numbers and rapacity. It compares an army, where the numbers are almoſt infinite, to a ſwarm of locuſts: it deſcribes them as riſing out of the earth, where they are produced; as purſuing a ſettled march to deſtroy the fruits of the earth, and co-operate with divine indignation.

When the locuſts take the field, as we are aſſured, they have a leader at their head, whoſe flight they obſerve, and pay a ſtrict attention to all his motions. They appear at a diſtance, like a black cloud, which, as it approaches, gathers upon the horizon, and almoſt hides the light of the day. It often happens, that the huſbandman ſees this imminent calamity paſs away without doing him any miſchief; and the whole ſwarm proceed onward, to ſettle upon the labours of ſome leſs fortunate country. But wretched is the diſtrict upon which they ſettle: they ravage the meadow and the paſture ground; ſtrip the trees of their leaves, and the garden of its beauty; the viſitation of a few minutes deſtroys the expectations of a year; and a famine but too frequently enſues. In their native tropical climates, they are not ſo dreadful as in the more ſouthern parts of Europe. There, though the plain and the foreſt be ſtripped of their verdure, the power of vegetation is ſo great, that an interval of three or four days repairs the calamity: but our verdure is the livery of a ſeaſon; and we muſt wait till the enſuing ſpring repairs the damage. Beſides, in their long flights to this part of the world, they are famiſhed by the tedioufneſs of their journey, and are therefore more voracious wherever they happen to ſettle. But it is not by what they devour that they do ſo much damage as by what they deſtroy. Their very bite is thought to contaminate the plant, and to prevent its vegetation. To uſe the expreſſion of the huſbandman, they burn whatever they touch; and leave the marks of their devaſtation for two or three years enſuing. But if they be noxious while living, they are ſtill more ſo when dead; for wherever they fall, they infect the air in ſuch a manner, that the ſmell is inſupportable.

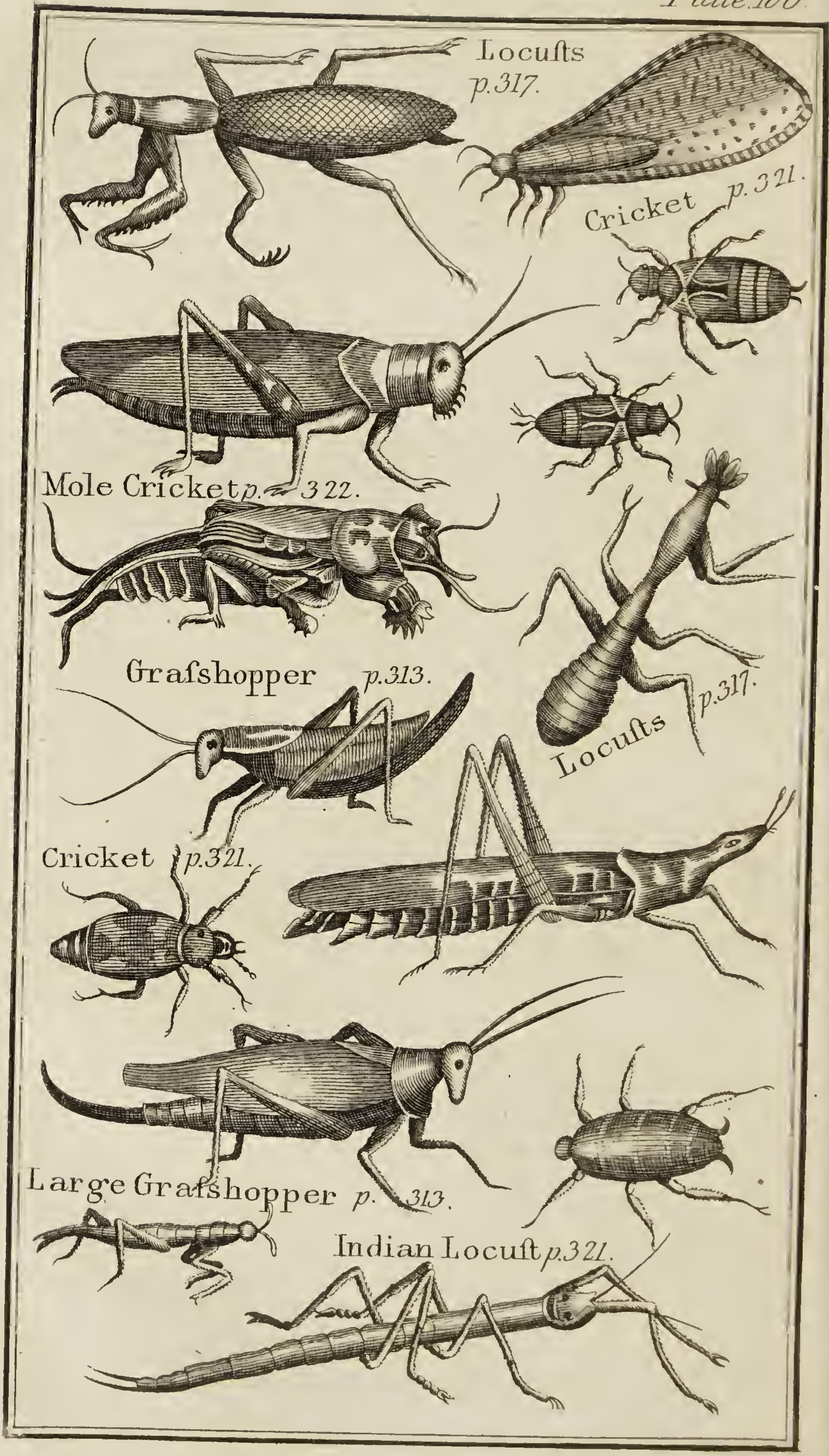
Oroſius tells us, that in the year of the world 3800, there was an incredible number of locuſts which infected Africa; and, after having eaten up every thing that was green, they flew off, and were drowned in the African ſea; where they cauſed ſuch a ſtench, that the putrefying bodies of hundreds of thouſands of men could not equal it.

In the year 1690, a cloud of locuſts was ſeen to enter Ruſſia in three different places; and thence to ſpread themſelves over Poland and Lithuania, in ſuch aſtoniſhing multitudes, that the air was darkened, and the earth covered with their numbers. In ſome places they were ſeen lying dead, heaped upon each other four feet deep; in others, they covered the ſurface like a black cloth: the trees bent beneath their weight; and the damage which the country ſuſtained exceeded computation. In Barbary their numbers are formidable, and their viſits are frequent. In the year 1724, Dr. Shaw was a witneſs in that country of their devaſtations. Their firſt appearance was about the latter end of March, when the wind had been ſoutherly for ſome time. In the beginning of April, their numbers were ſo vaſtly increaſed, that, in the heat of the day, they formed themſelves into large ſwarms, which appeared like clouds, and darkened the ſun. In the middle of May, they began to diſappear, retiring into the plains to depoſit their eggs. In the next month, being June, the young brood began to make their appearance, forming many compact bodies of ſeveral hundred yards ſquare; which afterwards marching forward, climbed the trees, walls, and houſes, eating every thing that was green in their way. The inhabitants, to ſtop their progreſs, laid trenches all over their fields and gardens, filling them with water. Some placed large quantities of heath, ſtubble, and ſuch like combuſtible matter, in rows, and ſet them on fire, on the approach of the locuſts; but all this was to no purpoſe; for the trenches were quickly filled up, and the fires put out by the vaſt number of ſwarms that ſucceeded each other. A day or two after one of theſe was in motion, others that were juſt hatched came to glean after them, gnawing off the young branches, and the very bark of the trees. Having lived near a month in this manner, they arrived at their full growth, and threw off their worm-like ſtate, by caſting their ſkins. To prepare themſelves for this change, they fixed their hinder feet to ſome buſh or twig, or corner of a ſtone, when immediately, by an undulating motion uſed on this occaſion, their heads would firſt appear, and ſoon after the reſt of their bodies. The whole transformation was performed in ſeven or eight minutes time; after which, they were a little while in a languiſhing condition; but as ſoon as the ſun and air had hardened their wings, and dried up the moiſture that remained after caſting off their ſloughs, they returned again to their former greedineſs, with an addition both of ſtrength and agility. But they did not continue long in this ſtate before they were entirely diſperſed; after laying their eggs, directing their courſe northward, and probably periſhed in the ſea. It is ſaid, that the holes theſe animals make, to depoſit their eggs, are four feet deep in the ground; the eggs are about four-ſcore in number, of the ſize of carraway comfits, and bundled up together in cluſters.

In ſome parts of the world, the inhabitants turn what ſeems a plague to their own advantage. Locuſts are eaten by the natives in many kingdoms of the Eaſt; and are caught in ſmall nets provided for that purpoſe. They parch them over the fire in an earthen pan; and when their wings and legs are fallen off, they turn reddiſh, of the colour of boiled ſhrimps. Dampier has eaten them thus prepared, and thinks them a tolerable diſh. The natives of Barbary alſo eat them fried with ſalt; and they are ſaid to taſte like cray-fiſh.

There is a locuſt in Tonquin, about the bigneſs of the top of a man's finger, and as long as the firſt joint. It breeds in the earth, in low grounds; and in the months of January and February, which is the ſeaſon for taking them, they iſſue from the earth in vaſt ſwarms. At firſt they can hardly fly, ſo that they often fall into the rivers in great numbers: however, the natives in theſe months watch the rivers, and take them up in multitudes in ſmall nets. They either eat them freſh, broiled on the coals, or pickle them for keeping. They are conſidered as a great delicacy in that part of the world, as well by the rich as the poor. In the countries where they are eaten, they are regularly brought to market, and ſold as larks or quails in Europe. They muſt have been a common food with the Jews, as Moſes, in the book of Leviticus, permits them to eat

Plate.100.


Locuſts p.317.
Cricket p.321.
Mole Cricket p. 322.
Graſshopper p.313.
Locuſts p.317.
Cricket p.321.
Large Graſshopper p. 313.
Indian Locuſt p.321.

eat four different kinds of this animal, which he takes care to ſpecify. This diſh, however, has not yet made its way into the kitchens of the luxurious in Europe; and though we may admire the delicacies of the Eaſt, we are as yet happily deprived of the powers of imitation.

Of all animals, however, of this noxious tribe, the *Great Weſt Indian Locuſt*, individually conſidered, is the moſt formidable. It is about the thickneſs of a gooſe-quill, and the body is divided into nine or ten joints, in the whole about ſix or ſeven inches long. It has two ſmall eyes, ſtanding out of the head like thoſe of crabs, and two feelers like long hair. The whole body is ſtudded with ſmall excreſcences, which are not much bigger than the points of pins. The ſhape is roundiſh, and the body diminiſhes in circumference to the tail, which is forked into two horns. Between theſe, there is a ſort of a ſheath, containing a ſmall dangerous ſting. If any perſon happens to touch this inſect, he is ſure to be ſtung; and is immediately taken with a ſhivering and trembling all over the body; which, however, may ſoon be put a ſtop to, by rubbing the place that was affected with a little palm oil.

From the locuſt we deſcend to the cricket (See pl. C.) which is a very inoffenſive animal. Though there be a ſpecies of this inſect that lives entirely in the woods and fields, yet that with which we are beſt acquainted is the *Houſe Cricket*, whoſe voice is ſo well known behind a country fire in a winter's evening. There is ſomething ſo unuſual in hearing a ſound while we do not ſee the animal producing it, nor diſcover the place whence it comes, that among the country people the chirping of the cricket is always held ominous; and whether it deſerts the fire-ſide, or pays an unexpected viſit, the credulous peaſantry always find ſomething to be afraid of.

The cricket very much reſembles the graſshopper in its ſhape, its manner of ruminating, its voice, its leaping, and methods of propagation. It differs in its colour, which is uniformly of a ruſty brown; in its food, which is more various; and in its place of reſidence, which is moſt uſually in the warmeſt chinks behind a country hearth. They are, in ſome meaſure, obliged to the bad maſonry employed in making peaſants houſes for their retreats. The ſmalleſt chink ſerves to give them ſhelter; and where they once make their abode they are ſure to propagate. They are of a moſt chilly nature, ſeldom leaving the fire-ſide; and, if undiſturbed, are ſeen to hop from their retreats to chirrup at the blaze in the chimney. The *wood-cricket* is the moſt timorous animal in nature; but the chimney-cricket, being uſed to noiſes, diſregards them. Whether the voice of this animal is formed in the ſame manner with that of the graſshopper, is not yet aſcertained; nor do we well know the uſe of this voice, ſince anatomical inſpection has not been able to diſcover the ſmalleſt organs of hearing. Still, however, we can make no doubt of their power of diſtinguiſhing ſounds, though probably not in the ſame manner with the more perfect ranks of nature. Certain it is, that they have been often heard to call, and this call is as regularly anſwered by another, although none but the males are vocal.

As the cricket lives chiefly in the dark, ſo its eyes ſeem formed for the gloomineſs of its abode; and thoſe who would ſurprize it, have only to light a candle unexpectedly; by which it is dazzled, and cannot find the way back to its retreat. It is a very voracious little animal, and will eat bread, flour, and meat; but it is particularly fond of ſugar. They never drink, but keep for months together at the back of the chimney, where they could poſſibly have had no moiſture. The warmth of their ſituation only ſerves to increaſe their mirth and loquacity.

The great Scaliger was particularly delighted with the chirrupping of crickets, and kept ſeveral of them for his amuſement, encloſed in a box, which he placed in a warm ſituation. Others, on the contrary, think there is ſomething ominous and melancholy in the ſound, and uſe every endeavour to baniſh this inſect from their houſes.

Ledelius tells us of a woman who was very much incommoded by crickets, and tried, but in vain, every method of baniſhing them from her houſe. She at laſt accidentally ſucceeded; for having one day invited ſeveral gueſts to her houſe, where there was a wedding, in order to increaſe the feſtivity of the entertainment, ſhe procured drums and trumpets to entertain them. The noiſe of theſe was ſo much greater than what the little animals were uſed to, that they inſtantly forſook their ſituation, and were never heard in that manſion more.

But of all the cricket kind, that which is called the *Mole Cricket* (See pl. C.) is the moſt extraordinary. This animal is the largeſt of all the inſects with which we are acquainted in this country, being two inches and an half in length, and three quarters of an inch in breadth. The colour is of a duſky brown; and, at the extremity of the tail, there are two hairy excreſcences, reſembling, in ſome degree, the tail of a mouſe. The body conſiſts of eight ſcaly joints, or ſeparate folds, is brown on the upper part, and more deeply tinged below. The wings are long, narrow, and terminate in a ſharp point, each having a blackiſh line running down it: however, when they are extended, they appear to be much broader than could at firſt ſight, be ſuppoſed. The ſhield of the breaſt is of a firm texture, of a blackiſh colour, and hairy. The fore-feet, which are this animal's principal inſtruments of burrowing into the earth, are ſtrong, webbed, and hairy; it generally, however, runs backward; but it is commonly under ground, where it burrows even faſter than a mole. It is thought alſo to be amphibious; and capable of living under water, as well as under ground.

Of all inſects this is the moſt deteſted by gardeners, as it chiefly reſides in that ground which lies light, and where it finds ſufficient plenty under the ſurface. Thus, in a ſingle night's time, it will run along a furrow which has been newly ſown, and rob it of all its contents. Its legs are formed in ſuch a manner, that it can penetrate the earth in every direction; before, behind, and above it. At night it ventures from its underground habitation, and, like the cricket, has its chirping call.

Nothing can exceed the care and aſſiduity which theſe animals exhibit in the preſervation of their young. Wherever the neſt is placed, there ſeems to be a fortification, avenues, and entrenchments, drawn round it: there are numberleſs winding ways that lead to it, and a ditch drawn about it, which few of its inſect enemies are able to paſs. But their care is not confined to this only; for, at the approach of winter, they carry their neſt entirely away, and ſink it deeper in the ground, ſo that the froſt can have no influence in retarding the young brood from coming to maturity. As the weather grows milder, they raiſe their magazine in proportion; till, at laſt, they bring it as near the ſurface as they can, to receive the genial influence of the ſun, without wholly expoſing it to view; yet, ſhould the froſt unexpectedly return, they ſink it again as before.

Of the Earwig.] We ſhould ſtill keep in memory, that all inſects of the ſecond order, though not produced quite perfect from the egg, yet want very little of their perfection,

fection, and require but a very ſmall change to arrive at that ſtate which fits them for flight and generation.

Of all this claſs of inſects, the earwig undergoes the ſmalleſt change. This animal is ſo common, that it ſcarce needs a deſcription: its ſwiftneſs, in the reptile ſtate, is not leſs remarkable than its indefatigable velocity when upon the wing. That it muſt be very prolific, appears from its numbers; and that it is very harmleſs, every one's experience can readily teſtify. It is provided with ſix feet, and two feelers: the tail is forked; and with this it often attempts to defend itſelf againſt every aſſailant. But its attempts are only the threats of impotence; they draw down the reſentment of powerful animals, but no way ſerve to defend it. The deformity of its figure, and its ſlender make, have alſo ſubjected it to an imputation, which, though entirely founded in prejudice, has more than once procured its deſtruction. It is ſuppoſed, as the name imports, that it often enters into the ears of people ſleeping; thus cauſing madneſs, from the intolerable pain, and ſoon after death itſelf.

Indeed, the French name, which ſignifies the ear-piercer, urges the calumny againſt this harmleſs inſect, in very plain terms: yet nothing can be more unjuſt; the ear is already filled with a ſubſtance which prevents any inſect from entering; and, beſides, it is well lined and defended with membranes, which would keep out any little animal, even though the ear-wax were away. Theſe reproaches, therefore, are entirely groundleſs: but it were well if the accuſations which gardeners bring againſt the earwig were as ſlightly founded. There is nothing more certain, than that it lives among flowers, and deſtroys them. When fruit alſo has been wounded by flies, the earwig generally comes in for a ſecond feaſt, and ſucks thoſe juices which they firſt began to broach. Still, however, this inſect is not ſo noxious as it would ſeem; and ſeldom is found but where the miſchief has been originally begun by others. Like all of this claſs, the earwig is hatched from an egg. As there are various kinds of this animal, ſo they chooſe different places to breed in: in general, however, they lay their eggs under the bark of plants, or in the clefts of trees, when beginning to decay. They proceed from the egg in that reptile ſtate in which they are moſt commonly ſeen; and, as they grow larger, the wings bound under the ſkin begin to burgeon. It is amazing how very little room four large wings take up before they are protruded; for no perſon could ever conceive ſuch an expanſion of natural drapery could be rolled up in ſo ſmall a pacquet. The ſheath in which they are enveloped, folds and covers them ſo neatly, that the animal ſeems quite deſtitute of wings; and even when they are burſt from their confinement, the animal, by the power of the muſcles and joints which it has in the middle of its wings, can cloſely fold them into a very narrow compaſs. When the earwig has become a winged inſect, it flies in purſuit of the female, ceaſing to feed, and is wholly employed in the buſineſs of propagation. It lives, in its winged ſtate, but a few days; and, having taken care for the continuance of poſterity, dries up, and dies, to all appearance conſumptive.

To this order of inſects we may alſo refer the CUCKOW SPIT, or *Froth Worm*, that is often found hid in that frothy matter which we find on the ſurface of plants. It has an oblong, obtuſe body; and a large head, with ſmall eyes. The external wings, for it has four, are of a duſky brown colour, marked with two white ſpots: the head is black. The ſpume in which it is found wallowing, is all of its own formation, and very much reſembles frothy ſpittle. It proceeds from the vent of the animal, and other parts of the body; and, if it be wiped away, a new quantity will be quickly ſeen ejected from the little animal's body. Within this ſpume, it is ſeen in time to acquire four tubercles on its back, wherein the wings are encloſed: theſe burſting, from a reptile it becomes a winged animal; and thus rendered perfect, it flies to meet its mate, and propagate its kind.

THE WATER TIPULA alſo belongs to this claſs. It has an oblong, ſlender body, with four feet fixed upon the breaſt, and four feelers near the mouth. It has four weak wings, which do not at all ſeem proper for flying, but leaping only.

But what this inſect chiefly demands our attention for, is, the wonderful lightneſs wherewith it runs on the ſurface of the water, ſo as ſcarcely to put it in motion. It is ſometimes ſeen in rivers, and on their banks, eſpecially under ſhady trees; and generally in ſwarms of ſeveral together.

The common WATER-FLY alſo breeds in the ſame manner with thoſe above-mentioned. This animal is by ſome called the Notonecta, becauſe it does not ſwim, in the uſual manner, upon its belly, but on its back: nor can we help admiring that fitneſs in this inſect for its ſituation, as it feeds on the under ſide of plants, which grow on the ſurface of the water; and therefore it is thus formed with its mouth upwards, to take its food with greater convenience and eaſe.

We may alſo add the *Water Scorpion*, which is a large inſect, being near an inch in length, and about half an inch in breadth. Its body is nearly oval, but very flat and thin; and its tail long and pointed. The head is ſmall; and the feelers appear like legs, reſembling the claws of a ſcorpion, but without ſharp points. This inſect is generally found in ponds; and is extremely tyrannical and rapacious.

It deſtroys, like a wolf among ſheep, twenty times as many as its hunger requires. One of theſe, when put into a baſon of water, in which were thirty or forty worms of the libellula kind, each as large as itſelf, deſtroyed them all in a few minutes, getting on their backs, and piercing with its trunk through their body. Theſe animals, however, though ſo formidable to others, are nevertheleſs themſelves greatly over-run with a little kind of louſe, about the ſize of a nit, which very probably repays the injury which the water-ſcorpion inflicts upon others.

The water-ſcorpions live in the water by day; out of which they riſe in the duſk of the evening into the air, and ſo flying from place to place, often betake themſelves, in queſt of food, to other waters. The inſect, before its wings are grown, remains in the place where it was produced; but when come to its ſtate of perfection, ſallies forth in ſearch of a companion of the other ſex, in order to continue its noxious poſterity.

The laſt inſect we ſhall add to this ſecond order, is the EPHEMERA; which, though not ſtrictly belonging to it, yet ſeems more properly referred to this rank than any other. Indeed, we muſt not attend to the rigour of method, in an hiſtory where Nature ſeems to take delight to ſport in variety.

That there ſhould be a tribe of flies, whoſe duration extends but to a day, ſeems at firſt ſurpriſing; but the wonder will increaſe, when we are told, that ſome of this kind ſeem to be born and die in the ſpace of a ſingle hour. The reptile, however, from which they are bred, is by no means ſo ſhort lived; but is ſometimes ſeen to live two years, and many times three years together.

All ephemeras, of which there are various kinds, are produced from the egg, in the form of worms; whence they change into a more perfect form; namely, that of aurelias, which is a kind of middle ſtate between a worm and a fly: and thence they take their laſt mutation, which is into a beautiful fly, of longer or ſhorter duration, according to its kind.

The ephemera, in its fly ſtate, is a very beautiful winged inſect, and has a ſtrong ſimilitude to the butterfly, both from its ſhape and its wings. It is about the ſize of a middling butterfly; but its wings differ, in not being covered with the painted duſt, with which thoſe of butterflies are adorned, and rendered opake, for they are very tranſparent, and very thin. Theſe inſects have four wings, the uppermoſt of which are much the largeſt: when the inſect is at reſt, it generlly lays its wings, one over the other, on the back. The body is long, being formed of ſix rings, that are larger at the origin than near the extremity; and from this a tail proceeds, that is longer than all the reſt of the fly, and conſiſts ſometimes of three threads of an equal length, or ſometimes of two long and one ſhort.

The reptile which is to become a fly, and which is granted ſo long a term, when compared to its latter duration, is an inhabitant of the water, and bears a very ſtrong reſemblance to fiſhes, in many particulars; having gills by which it breathes at the bottom, and alſo the tapering form of aquatic animals. Theſe inſects have ſix ſcaly legs, fixed on their corſelet. Their head is triangular: the eyes are placed forward, and may be diſtinguiſhed by their largeneſs and colour. The mouth is furniſhed with teeth; and the body conſiſts of ſix rings; that next the corſelet being largeſt, but growing leſs and leſs to the end: the laſt ring is the ſhorteſt, from which the three threads proceed, which are as long as the whole body. Thus we ſee, that the reptile bears a very ſtrong reſemblance to the fly; and only requires wings, to be very near its perfection.

As there are ſeveral kinds of this animal, their aurelias are conſequently of different colours; ſome yellow, ſome brown, and ſome cream-coloured. Some of theſe alſo bore themſelves cells at the bottom of the water, from which they never ſtir out, but feed upon the mud compoſing the walls of their habitation, in contented captivity; others, on the contrary, range about, go from the bottom to the ſurface, ſwim between two waters, quit that element entirely to feed upon plants by the river ſide, and then return to their favourite element, for ſafety and protection.

The peculiar ſign whereby to know that theſe reptiles will change into flies in a ſhort time, conſiſts in a protuberance of the wings on the back. About that time, the ſmooth and depreſſed form of the upper part of the body is changed into a more ſwollen and rounder ſhape; ſo that the wings are, in ſome degree, viſible through the external ſheath that covers them. As they are not natives of England, he who would ſee them in their greateſt abundance, muſt walk, about ſun-ſet, along the banks of the Rhine, or the Seine, near Paris; where, for about three days, in the midſt of the ſummer, he will be aſtoniſhed at their numbers and aſſiduity. The thickeſt deſcent of the flakes of ſnow in winter ſeems not to equal their number; the whole air ſeems alive with the new-born race, and the earth itſelf is all over covered with their remains. The aurelias, or reptile inſects, that are as yet beneath the ſurface of the water, wait only for the approach of evening to begin their transformation. The moſt induſtrious ſhake off their old garments about eight o'clock; and thoſe who are the moſt tardy, are transformed before nine.

We have already ſeen that the operation of change in other inſects is laborious and painful; but with theſe nothing ſeems ſhorter, or performed with greater eaſe. The aurelias are ſcarce lifted above the ſurface of the water, than their old ſheathing ſkin burſts; and through the cavity which is thus formed, a fly iſſues, whoſe wings, at the ſame inſtant are unfolded, and at the ſame time lift it into the air.

Millions and millions of aurelias riſe in this manner to the ſurface; and at once become flies, and fill every quarter with their flutterings. But all theſe ſports are ſhortly to have an end; for as the little ſtrangers live but an hour or two, the whole ſwarm ſoon falls to the ground, and covers the earth, like a deep ſnow, for ſeveral hundred yards, on every ſide of the river. Their numbers are then incredible, and every object they touch becomes fatal to them; for they inſtantly die, if they even hit againſt each other.

At this time, the males and females are very differently employed. The males, quite inactive, and apparently without deſires, ſeem only born to die: no way like the males of other inſects; they neither follow the oppoſite ſex, nor bear any enmity to each other: after fluttering for an hour or two, they drop upon land, without ſeeming to receive wings for any other purpoſe but to ſatisfy an idle curioſity. It is otherwiſe with the females; they are ſcarce riſen from the ſurface of the water, and have dried their wings, but they haſten to drop their eggs back again. If they happen alſo to flutter upon land, they depoſit their burthen in the place where they drop.

Of all inſects, this appears to be the moſt prolific; and it would ſeem that there was a neceſſity for ſuch a ſupply, as, in its reptile ſtate, it is the favourite food of every kind of freſh-water fiſh. It is in vain that theſe little animals form galleries at the bottom of the river, whence they ſeldom remove; many kinds of fiſh break in upon their retreats, and thin their numbers. For this reaſon, fiſhermen are careful to provide themſelves with theſe inſects, as the moſt grateful bait; and thus turn the fiſh's rapacity to its own deſtruction.

But though the uſual date of thoſe flies is two or three hours at fartheſt, there are ſome kinds that live ſeveral days; and one kind in particular, after quitting the water, has another caſe or ſkin to get rid of. Theſe are often ſeen in the fields and woods, diſtant from the water; but they are more frequently found in its vicinity. They are often found ſticking upon walls and trees; and frequently with the head downwards, without changing place, or having any ſenſible motion. They are then waiting for the moment when they ſhall be diveſted of their laſt incommodious garment, which ſometimes does not happen for two or three days together.

CHAP. XXXVII.

Of Inſects of the Third Order—CATERPILLARS—*Change to the Aurelia—To the Butterfly*—MOTHS—*Singular Cauſe for the Deſtruction of Caterpillars—The* SILKWORM—*Mode of rearing it—Its Changes.*

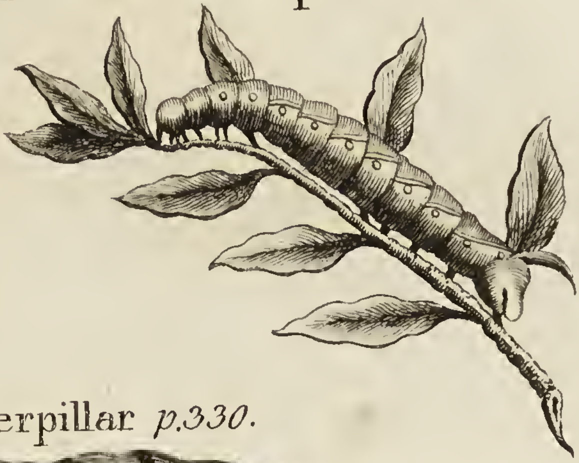
CATERPILLARS (See pl. CI.) may be eaſily diſtinguiſhed from worms or maggots, by the number of their feet; and by their producing butterflies or moths. When the ſun calls up vegetation, and vivifies the various eggs of inſects, the caterpillars are the firſt that are ſeen, upon almoſt every vegetable and tree, eating its leaves, and preparing for a ſtate of greater perfection. They have feet both before and behind; which not only enable them to move forward by a ſort of ſteps made by their fore and hinder parts, but alſo to climb up vegetables, and to ſtretch themſelves out from the boughs and ſtalks, to reach their food at a diſtance. All of this claſs have from eight feet, at the leaſt, to ſixteen; and this may ſerve to diſtinguiſh them from the worm tribe, that never have ſo many. The animal into which they are converted, is always a butterfly or a moth; and theſe are always diſtinguiſhed from other flies, by having their wings covered over with a painted duſt, which gives them ſuch various beauty. The wings of flies are tranſparent, as we ſee in the common fleſh fly; while thoſe of beetles are hard, like horn: from ſuch the wing of a butterfly may be eaſily diſtinguiſhed; and words would obſcure their differences.

When the caterpillar firſt burſts from the egg, it is ſmall and feeble; its appetites are in proportion to its ſize, and it ſeems to make no great conſumption: but as it encreaſes in magnitude, it improves in its appetites; ſo that, in its adult caterpillar ſtate, it is the moſt ravenous of all animals whatſoever. A ſingle caterpillar will eat double its own weight of leaves in a day, and yet ſeems no way diſordered by the meal. What would mankind do, if their oxen or their horſes were ſo voracious?

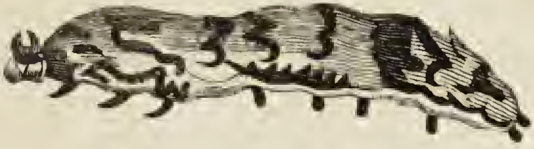
The body of the caterpillar, when anatomically conſidered, is found compoſed of rings, whoſe circumference is

Plate.101.

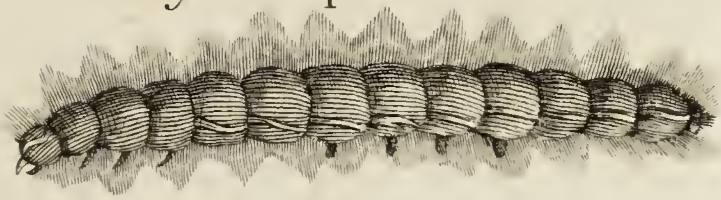
Green Privet Caterpillar *p.330.*



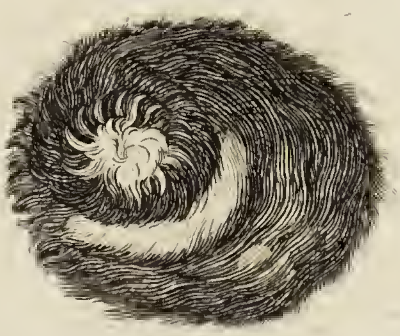
Caterpillar *p.330.*



Hairy Caterpillars *p.330.*



D^o^ *p.330.*



Aurelia *p.334.*

D^o^ *p.334.*

pretty near circular or oval. They are generally twelve in number, and are all membranaceous; by which caterpillars may be diſtinguiſhed from many other inſects, that nearly reſemble them in form. The head of the caterpillar is connected to the firſt ring by the neck, which is generally ſo ſhort and contracted, that it is ſcarce viſible. All the covering of the head in caterpillars ſeems to conſiſt of a ſhell; and they have neither upper nor under jaw, for they are both placed rather vertically, and each jaw armed with a large thick tooth, which is ſingly equal to a number. With theſe the animals devour their food in ſuch amazing quantities; and, with theſe, ſome of the kind defend themſelves againſt their enemies. Though the mouth be kept ſhut, the teeth are always uncovered; and, while the inſect is in health, they are ſeldom without employment. Whatever the caterpillar devours, theſe teeth ſerve to chop into ſmall pieces, and render the parts of the leaf fit for ſwallowing. Many kinds, while they are yet young, eat only the ſucculent part of the leaf, and leave all the fibres untouched; others, however, attack the whole leaf, and eat it clean away. One may be amuſed, for a little time, in obſerving the avidity with which they are ſeen to feed; ſome are ſeen eating the whole day; others have their hours of repaſt; ſome chuſe the night, and others the day. When the caterpillar attacks a leaf, it places its body in ſuch a manner, that the edge of the leaf ſhall fall between its feet, which keeps it ſteady, while the teeth are employed in cutting it: theſe fall upon the leaf, ſomewhat in the manner of a pair of gardener's ſheers; and every morſel is ſwallowed as ſoon as cut. Some caterpillars feed upon leaves ſo very narrow, that they are not broader than their mouths; in this caſe the animal is ſeen to devour it from the point, as we would eat a radiſh.

As there are various kinds of caterpillars, the number of their feet are various; ſome having eight, and ſome ſixteen. Of theſe feet, the ſix foremoſt are covered with a ſort of ſhining griſtle; and are therefore called the ſhelly legs. The hindmoſt feet, whatever be their number, are ſoft and flexible, and are called membranaceous. Caterpillars alſo, with regard to their external figure, are either ſmooth or hairy (See pl. CI.) The ſkin of the firſt kind is ſoft to the touch, or hard, like ſhagreen; the ſkin of the latter is hairy, and, as it were, thorny; and generally, if handled, ſtings like nettles.

Caterpillars, in general, have ſix ſmall black ſpots, placed on the circumference of the fore ring, and a little to the ſide of the head. Three of theſe are larger than the reſt, and are convex and tranſparent: theſe Reaumur takes to be the eyes of the caterpillar; however, moſt of theſe reptiles have very little occaſion for ſight, and ſeem only to be directed by their feeling.

But the parts of the caterpillar's body which moſt juſtly demand our attention, are the ſtigmata, as they are called; or thoſe holes on the ſides of its body, through which the animal is ſuppoſed to breathe. All along this inſect's body, on each ſide, theſe holes are eaſily diſcoverable. They are eighteen in number, nine on a ſide, rather nearer the belly than the back; a hole for every ring, of which the animal's body is compoſed, except the ſecond, the third, and the laſt. Theſe oval openings may be conſidered as ſo many mouths, through which the inſect breathes; but with this difference, that as we have but one pair of lungs, the caterpillar has no leſs than eighteen. It requires no great anatomical dexterity to diſcover theſe lungs in the larger kind of caterpillars: they appear, at firſt view, to be hollow cartilaginous tubes, and of the colour of mother-of-pearl. Theſe tubes are often ſeen to unite with each other; ſome are perceived to open into the inteſtines; and ſome go to different parts of the ſurface of the body. That theſe veſſels ſerve to convey the air, appears evidently, from the famous experiment of Malpighi; who, by ſtopping up the mouths of the ſtigmata with oil, quickly ſuffocated the animal, which was ſeen to die convulſed the inſtant after. In order to aſcertain his theory, he rubbed oil upon other parts of the inſect's body, leaving the ſtigmata free; and this ſeemed to have no effect upon the animal's health, but it continued to move and eat as uſual: he rubbed oil on the ſtigmata of one ſide, and the animal underwent a partial convulſion, but recovered ſoon after. However, it ought to be obſerved, that air is not ſo neceſſary to theſe as to the nobler ranks of animals, ſince caterpillars will live in an exhauſted receiver for ſeveral days together; and though they ſeem dead at the bottom, yet, when taken out, recover, and reſume their former vivacity.

If the caterpillar be cut open longitudinally along the back, its inteſtines will be perceived running directly in a ſtraight line from the mouth to the anus. They reſemble a number of ſmall bags opening into each other; and ſtrengthened on both ſides by a fleſhy cord, by which they are united. Theſe inſects are, upon many occaſions, ſeen to caſt forth the internal coat of their inteſtines with their food, in the changes which they ſo frequently undergo. But the inteſtines take up but a ſmall part of the animal's body, if compared to the fatty ſubſtance in which they are involved. This ſubſtance changes its colour when the inſect's metamorphoſis begins to approach; and from white it is uſually ſeen to become yellow. If to theſe parts, we add the caterpillar's implements for ſpinning, (for all caterpillars ſpin at one time or another) we ſhall have a rude ſketch of this animal's conformation.

The life of a caterpillar ſeems one continued ſucceſſion of changes; and it is ſeen to throw off one ſkin only to aſſume another; which alſo is diveſted in its turn: and thus for eight or ten times ſucceſſively.

How laborious ſoever this operation may be, it is performed in the ſpace of a minute; and the animal, having thrown off its old ſkin, ſeems to enjoy new vigour, as well as to have acquired colouring and beauty. Sometimes it happens that it takes a new appearance, and colours very different from the old. Thoſe that are hairy, ſtill preſerve their covering, although their ancient ſkin ſeems not to have loſt a ſingle hair; every hair appears to have been drawn, like a ſword from the ſcabbard. The fact, however, is, that a new crop of hair grows between the old ſkin and the new, and probably helps to throw off the external covering.

The caterpillar having in this manner continued for ſeveral days feeding, and at intervals caſting its ſkin, begins at laſt to prepare for its change into an aurelia.

Preparatory to this important change, the caterpillar moſt uſually quits the plant, or the tree on which it fed; or at leaſt attaches itſelf to the ſtalk or the ſtem, more gladly than the leaves. It forſakes its food, and prepares, by faſting, to undergo its tranſmutation.

Thoſe of them which are capable of ſpinning themſelves a web, ſet about this operation; thoſe which have already ſpun, await the change in the beſt manner they are able. The web or cone, with which ſome cover themſelves, hides the aurelia contained within from the view; but in others, where it is more tranſparent, the caterpillar, when it has done ſpinning, ſtrikes in the claws of the two feet under the tail, and afterwards forces in the tail itſelf, by contracting thoſe claws, and violently ſtriking the feet one againſt the other. If, however, they be taken from their web at this time, they appear in a ſtate of great languor; and, incapable of walking, remain on that ſpot where they are placed. In this condition they remain one or two days, preparing to change into an aurelia; ſomewhat in the manner they made preparations for changing their ſkin. They then appear with their bodies bent into a bow, which they now and then are ſeen to ſtraiten: they make no uſe of their legs; but, if they attempt to change place, do it by the contortions of their body.

In proportion as their change into an aurelia approaches, their body becomes more and more bent; while their extenſions and convulſive contractions become more frequent. The hinder end of the body is the part which the animal firſt diſengages from its caterpillar ſkin; that part of the ſkin remains empty, while the body is drawn up contracted towards the head. In the ſame manner they diſengage themſelves from the two ſucceeding rings; ſo that the animal is then lodged entirely in the fore part of its caterpillar covering; that half which is abandoned, remains flaccid and empty; while the fore part, on the contrary, is ſwollen and diſtended. The animal, having thus quitted the hinder part of its ſkin, to drive itſelf up into the fore part, ſtill continues to heave and work as before; ſo that the ſkull is ſoon ſeen to burſt into three pieces, and a longitudinal opening is made in the three firſt rings of the body, through which the inſect thruſts forth its naked body, with ſtrong efforts. Thus, at laſt, it entirely gets free from its caterpillar ſkin, and for ever forſakes its moſt odious reptile form.

The caterpillar, thus ſtripped of its ſkin for the laſt time, is now become an aurelia, (See pl. CI.) in which the parts of the future butterfly are all viſible; but in ſo ſoft a ſtate, that the ſmalleſt touch can diſcompoſe them. The animal is now become helpleſs and motionleſs.

Immediately after being ſtripped of its caterpillar ſkin, it is of a green colour, eſpecially in thoſe parts which are diſtended by an extraordinary afflux of animal moiſture; but in ten or twelve hours after being thus expoſed, its parts harden, the air forms its external covering into a firm cruſt.

From the beautiful and reſplendent colour, with which it is thus ſometimes adorned, ſome authors have called it a chryſalis, implying a creature made of gold.

The butterfly does not continue ſo long under the form of an aurelia, as one would be apt to imagine. In general, thoſe caterpillars that provide themſelves with cones, continue within them but a few days after the cone is completely finiſhed. Some, however, remain buried in this artificial covering for eight or nine months, without taking the ſmalleſt ſuſtenance during the whole time: and though in the caterpillar ſtate no animals were ſo voracious, when thus transformed, they appear a miracle of abſtinence. In all, ſooner or later, the *butterfly* burſts from its priſon; not only that natural priſon which is formed by the ſkin of the aurelia, but alſo from that artificial one of ſilk, or any other ſubſtance in which it has encloſed itſelf.

If the animal be ſhut up within a cone, the butterfly always gets rid of the natural internal ſkin of the aurelia, before it eats its way through the external covering which its own induſtry has formed round it. In order to obſerve the manner in which it thus gets rid of the aurelia covering, we muſt cut open the cone, and then we ſhall have an opportunity of diſcovering the inſect's efforts to emancipate itſelf from its natural ſhell. When this operation begins, there ſeems to be a violent agitation in the humours contained within the little animal's body.

The ſkin of the head and legs firſt ſeparates; then the ſkin at the back flies open, and, dividing into two regular portions, diſengages the back and wings: then there likewiſe happens another rupture, in that portion which covered the rings of the back of the aurelia. After this, the butterfly, as if fatigued with its ſtruggles, remains very quiet for ſome time, with its wings pointed downwards, and its legs fixed in the ſkin which it had juſt thrown off. At firſt ſight, the animal, juſt permitted the uſe of its wings, ſeems to want them entirely: they take up ſuch little room, that one would wonder where they were hidden. But ſoon after, they expand ſo rapidly, that the eye can ſcarcely attend their unfolding.

Nor is it the wings alone that are thus increaſed: all their ſpots and paintings, before ſo minute as to be ſcarcely diſcernible, are proportionably extended; ſo that, what a few minutes before ſeemed only a number of confuſed, unmeaning points, now become diſtinct and moſt beautiful ornaments.

The wing, at the inſtant it is freed from its confinement, is conſiderably thicker than afterwards; ſo that it ſpreads in all its dimenſions, growing thinner as it becomes broader. If one of the wings be plucked from the animal juſt ſet free, it may be ſpread by the fingers, and it will ſoon become as broad as the other, which has been left behind. As the wings extend themſelves ſo ſuddenly, they have not yet had time to dry; and accordingly appear like pieces of wet paper, ſoft, and full of winkles. In about half an hour, they are perfectly dry, their wrinkles entirely diſappear, and the little animal aſſumes all its ſplendor.

The number of theſe beautiful animals is very great; and though Linnæus has reckoned up above ſeven hundred and ſixty different kinds, the catalogue is ſtill very incomplete. Every collector of *butterflies* can ſhew undeſcribed ſpecies (See pl. CII, and CIII.) and ſuch as are fond of minute diſcovery, can here produce animals that have been examined only by himſelf. In general, however, thoſe of the warmer climates are larger and more beautiful than ſuch as are bred at home.

The wings of butterflies, as was obſerved, fully diſtinguiſh them from flies of every other kind. They are four in number; and though two of them be cut off, the animal can fly with the two others remaining. They are, in their own ſubſtance, tranſparent; but owe their opacity to the beautiful duſt with which they are covered: if we regard the wing of a butterfly with a good microſcope, we ſhall perceive it ſtudded over with a variety of little grains of different dimenſions and forms, generally ſupported upon a footſtalk, regularly laid upon the whole ſurface. The wing itſelf is compoſed of ſeveral membranes, which render the conſtruction very ſtrong, though light; and though it be covered over with thouſands of theſe ſcales or ſtuds, yet its weight is very little encreaſed by the number. The animal is with eaſe enabled to ſupport itſelf a long while in air, although its flight be not very graceful. When it deſigns to fly to a conſiderable diſtance, it aſcends and deſcends alternately; going ſometimes to the right, ſometimes to the left, without any apparent reaſon. Upon cloſer examination, however, it will be found that it flies thus irregularly in purſuit of its mate: and as dogs bait and quarter the ground in purſuit of their game, ſo theſe inſects traverſe the air, in queſt of their mates, whom they can diſcover at more than a mile's diſtance.

Plate.102.

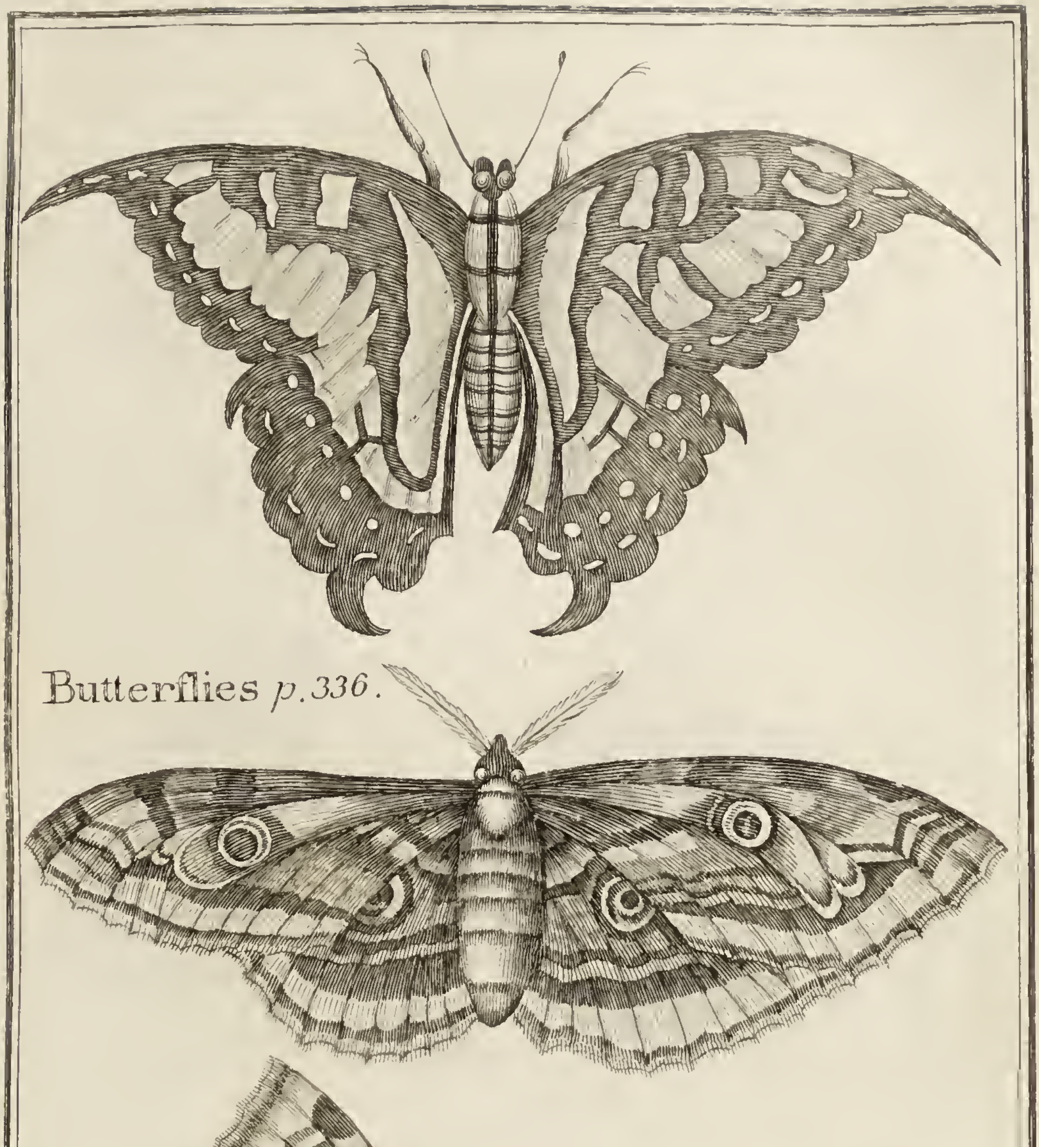
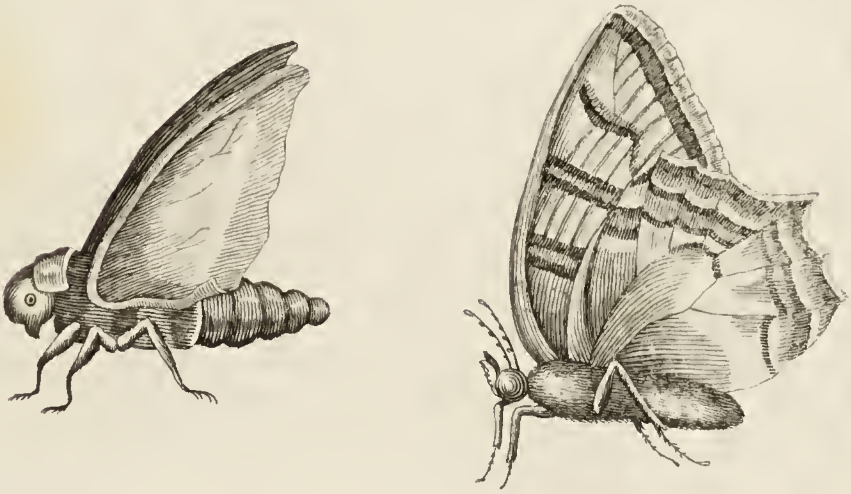


Plate.103.

Butterflies *p.336.*



Moths *p.338.*

If we proſecute our deſcription of the butterfly, the animal may be divided into three parts; the head, the corſelet, and the body.

The body is the hinder part of the butterfly, and is compoſed of rings, which are generally concealed under long hair, with which that part of the animal is clothed. The corſelet is more ſolid than the reſt of the body, becauſe the fore wings, and the legs, are fixed therein. The legs are ſix in number, although four only are made uſe of by the animal; the two fore legs being often ſo much concealed in the long hair of the body, that it is ſometimes difficult to diſcover them.

But leaving the other parts of the butterfly, let us turn our attention particularly to the head. The eyes of butterflies have not all the ſame form; for, in ſome they are large, in others ſmall; in ſome they are the larger portion of a ſphere, in others they are but a ſmall part of it, and juſt appearing from the head. In all of them, however, the outward coat has a luſtre, in which may be diſcovered the various colours of the rainbow. When examined a little cloſely, it will be found to have the appearance of a multiplying glaſs; having a great number of ſides, or facets, in the manner of a brilliant cut diamond. In this particular, the eye of the butterfly, and of moſt other inſects, entirely correſpond; and Leuwenhoek pretends, there are above ſix thouſand facets on the cornea of a flea. Theſe animals, therefore, ſee not only with great clearneſs, but view every object multiplied in a ſurpriſing manner. Puget adapted the cornea of a fly in ſuch a poſition, as to ſee objects through it by the means of a microſcope; and nothing could exceed the ſtrangeneſs of its repreſentations: a ſoldier, who was ſeen through it, appeared like an army of pigmies; for while it multiplied, it alſo diminiſhed the object; the arch of a bridge exhibited a ſpectacle more magnificent than human ſkill could perform; the flame of a candle ſeemed a beautiful illumination. It ſtill, however, remains a doubt, whether the inſect ſees objects ſingly, as with one eye; or whether every facet is itſelf a complete eye, exhibiting its own object diſtinct from all the reſt.

Butterflies, as well as moſt other flying inſects, have two inſtruments, like horns, on their heads, which are commonly called feelers. They differ from the horns of greater animals, in being moveable at their baſe; and in having a great number of joints, by which means the inſect is enabled to turn them in every direction. Thoſe of butterflies are placed at the top of the head, pretty near the external edge of each eye. What the uſe of theſe inſtruments may be, which are thus formed with ſo much art, and by a workman who does nothing without reaſon, is as yet unknown to man. They may ſerve to guard the eye; they may be of uſe to clean it; or they may be the organ of ſome ſenſe of which we are ignorant: but this is only explaining one difficulty by another.

We are not ſo ignorant of the uſes of the trunk, which few inſects of the butterfly kind are without. This inſtrument is placed exactly beetween the eyes; and when the animal is not employed in ſeeking its nouriſhment, it is rolled up, like a curl. A butterfly, when it is feeding flies round ſome flower, and ſettles upon it. The trunk is then uncurled, and thruſt out either wholly or in part; and is employed in ſearching the flower to its very bottom, let it be ever ſo deep. This ſearch being repeated ſeven or eight times, the butterfly then paſſes to another; and continues to hover over thoſe agreeable to its taſte, like a bird over its prey. This trunk conſiſts of two equal hollow tubes, nicely joined to each other, like the pipes of an organ.

This tribe of inſects has been divided into Diurnal and Nocturnal flies; or, more properly ſpeaking, into *butterflies* and *moths* (See pl. CIII.) the one only flying by day, the other moſt uſually on the wing in the night. They may be eaſily diſtinguiſhed from each other, by their horns or feelers; thoſe of the butterfly being clubbed, or knobbed at the end; thoſe of the moth, tapering finer and finer to a point. To expreſs it technically—the feelers of butterflies are clavated; thoſe of moths, are filiform.

The butterflies, as well as the moths, employ the ſhort life aſſigned them in a variety of enjoyments. Their whole time is ſpent either in queſt of food, which every flower offers; or in purſuit of the female, whoſe approach they can often perceive at above two miles diſtance. Their ſagacity in this particular is not leſs aſtoniſhing than true; but by what ſenſe they are thus capable of diſtinguiſhing each other at ſuch diſtances is not eaſy to conceive. It cannot be by the ſight, ſince ſuch ſmall objects as they are muſt be utterly imperceptible, at half the diſtance at which they perceive each other: it can ſcarcely be by the ſenſe of ſmelling, ſince the animal appears to have no organs for that purpoſe.

The general rule among inſects is, that the female is larger than the male; and this obtains particularly in the tribe we are deſcribing. The body of the male is ſmaller and ſlenderer; that of the female, more thick and oval. The eggs of the female butterflies are diſpoſed in the body like a bed of chaplets; which, when excluded, are uſually oval; and of a whitiſh colour: ſome, however, are quite round; and others flatted, like a turnip. The covering or ſhell of the egg, though ſolid, is thin and tranſparent; and in proportion as the caterpillar grows within the egg, the colours change, and are diſtributed differently. The butterfly ſeems very well inſtructed by nature in its choice of the plant, or the leaf, where it ſhall depoſit its burthen. Each egg contains but one caterpillar; and it is requiſite that this little animal, when excluded, ſhould be near its peculiar proviſion. All the eggs of butterflies are attached to the leaves of the favourite plant, by a ſort of ſize or glue; where they continue, unobſerved, unleſs carefully ſought after. The eggs are ſometimes placed round the tender ſhoots of plants, in the form of bracelets, conſiſting of above two hundred in each, and generally ſurrounding the ſhoot, like a ring upon a finger. Some butterflies ſecure their eggs from the injuries of air, by covering them with hair, plucked from their own bodies, as birds ſometimes are ſeen to make their neſts; ſo that their eggs are thus kept warm, and alſo entirely concealed.

The maxim which has been often urged againſt man, that he, of all other animals, is the only creature that is an enemy to his own kind, and that the human ſpecies only are found to deſtroy each other, has been adopted by perſons who never conſidered the hiſtory of inſects. Some of the caterpillar kind in particular, that ſeem fitted only to live upon leaves and plants, will, however, eat each other; and the ſtrongeſt will devour the weak, in preference to their vegetable food. That which lives upon the oak, is found to ſeize any of its companions, which it conveniently can, by the firſt rings, and inflict a deadly wound: it then feaſts in tranquillity on its prey, and leaves nothing of the animal but the huſk.

But it is not from each other they have moſt to fear, as in general they are inoffenſive; and many of this tribe are found to live in a kind of ſociety. Many kind of flies lay their eggs either upon, or within their bodies; and as theſe turn into worms, the caterpillar is ſeen to nouriſh a ſet of inteſtine enemies within its body, that muſt ſhortly be its deſtruction: Nature having taught flies, as well as all other animals, the ſureſt methods of perpetuating their kind. "Towards the end of Auguſt," ſays Reaumur, "I perceived a little fly, of a beautiful gold colour, "buſily employed in the body of a large caterpillar, of "that kind which feeds upon cabbage. I gently ſeparated "that part of the leaf on which theſe inſects were placed, "from the reſt of the plant, and placed it where I might "obſerve them more at my eaſe. The fly, wholly taken "up by the buſineſs in which it was employed, walked "along the caterpillar's body, now and then remaining "fixed to a particular ſpot. Upon this occaſion, I per"ceived it every now and then dart a ſting, which it car"ried at the end of its tail, into the caterpillar's body, "and then drew it out again, to repeat the ſame ope"ration in another place. It was not difficult for me to "conjecture the buſineſs which engaged this animal ſo "earneſtly; its whole aim was to depoſit its eggs in the "caterpillar's body; which was to ſerve as a proper re"treat for bringing them to perfection. The reptile "thus rudely treated, ſeemed to bear all very patiently, "only moving a little when ſtung too deeply; which, "however, the fly ſeemed entirely to diſregard. I took "particular care to feed this caterpillar; which ſeemed to "me to continue as voracious and vigorous as any of the "reſt of its kind. In about ten or twelve days, it changed "into an aurelia, which ſeemed gradually to decline, and died: "upon examining its internal parts, the animal was en"tirely devoured by worms; which, however, did not "come to perfection, as it is probable they had not enough "to ſuſtain them within."

THE SILKWORM. Though ſilk was anciently brought in ſmall quantities to Rome, yet it was ſo ſcarce as to be ſold for its weight in gold; and was conſidered as ſuch a luxurious refinement in dreſs, that it was infamous for a man to appear in habits of which ſilk formed but half the compoſition. It was moſt probably brought among them from the remoteſt parts of the Eaſt; ſince it was, at the time of which we are ſpeaking, ſcarcely known even in Perſia.

The ſilkworm (See pl. CIV.) is a large caterpillar, of a whitiſh colour, with twelve feet, and producing a butterfly of the moth kind. There are two methods of breeding ſilkworms; for they may be left to grow, and remain at liberty upon the trees where they are hatched; or they may be kept in a place built for that purpoſe, and fed every day with freſh leaves. The firſt method is uſed in China, Tonquin, and other hot countries; but to breed them in Europe, they muſt be ſheltered and protected from every external injury. For this purpoſe, a room is choſen, with a ſouth aſpect; and the windows are ſo well glazed, as not to admit the leaſt air; the walls are well built, and the planks of the floor exceeding cloſe, ſo as to admit neither birds nor mice, nor even ſo much as an inſect. In the middle there ſhould be four pillars erected, or four wooden poſts, ſo placed as to form a pretty large ſquare. Between theſe are different ſtories made with ozier hurdles; and under each hurdle there ſhould be a floor, with an upright border all round. Theſe hurdles and floors muſt hang upon pulleys, ſo as to be placed, or taken down at pleaſure.

When the worms are hatched, ſome tender mulberry leaves are provided, and placed in the cloth or paper box in which the eggs were laid, and which are large enough to hold a great number. When they have acquired ſome ſtrength, they muſt be diſtributed on beds of mulberry leaves, in the different ſtories of the ſquare in the middle of the room, round which a perſon may freely paſs on every ſide. They will fix themſelves to the leaves, and afterwards to the ſticks of the hurdles, when the leaves are devoured.. They have then a thread, by which they can ſuſpend themſelves on occaſion, to prevent any ſhock by a fall. Care muſt be taken that freſh leaves be brought every morning, which muſt be ſtrewed very gently and equally over them; upon which the ſilkworms will forſake the remainder of the old leaves, which muſt be carefully taken away, and every thing kept very clean; for nothing hurts theſe inſects ſo much as moiſture and uncleanlineſs. For this reaſon, the leaves muſt be gathered when the weather is dry, and kept in a dry place, if it be neceſſary to lay in a ſtore. As theſe animals have but a ſhort time to live, they make uſe of every moment, and almoſt continually are ſpinning, except at thoſe intervals when they change their ſkins. If mulberry leaves be difficult to be obtained, the leaves of lettuce or holyoak will ſuſtain them: but they do not thrive ſo well upon their new diet; and their ſilk will neither be ſo copious, nor of ſo good a quality.

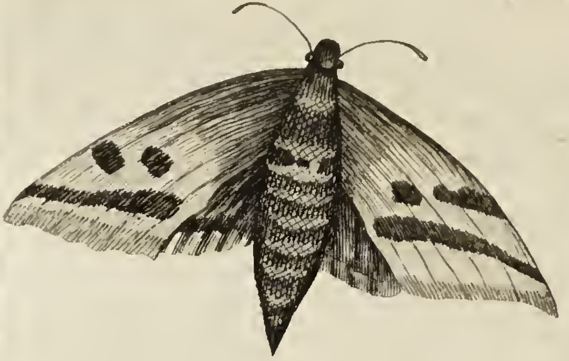
Though the judicious choice, and careful management of their diet, is abſolutely neceſſary, yet there is another precaution of equal importance, which is to give them air, and open their chamber windows, at ſuch times as the ſun ſhines warmeſt.

The worm, at the time it burſts the ſhell, is extremely ſmall, and of a black colour; but the head is of a more ſhining black than the reſt of the body: ſome days after, they begin to turn whitiſh, or of an aſh-coloured grey. After the ſkin begins to grow too rigid, or the animal is ſtinted with it, the inſect throws it off, and appears clothed a-new: it then becomes larger and much whiter, though it has a greeniſh caſt: after ſome days, which are more or leſs, according to the different heat of the climate, or to the quality of the food, it leaves off eating, and ſeems to ſleep for two days together: then it begins to ſtir, and puts itſelf into violent motions, till the ſkin falls off the ſecond time, and is thrown aſide by the animal's feet. All theſe changes are made in three weeks or a month's time; after which it begins to feed once more, ſtill in its caterpillar form, but a good deal differing from itſelf before its change (See pl. CIV.) In a few days time it ſeems to ſleep again; and, when it awakes, it again changes its clothing, and continues feeding as before. When it has thus taken a ſufficiency of food, and its parts are diſpoſed for aſſuming the aurelia form, the animal forſakes, for the laſt time, all food and ſociety, and prepares itſelf a retreat to defend it from external injuries, while it is ſeemingly deprived of life and motion.

This retreat is no other than its cone (See pl. CIV.) or ball of ſilk, which Nature has taught it to compoſe with great art; and within which it buries itſelf, till it aſſumes its winged form. This cone or ball is ſpun from two little longiſh kinds of bags that lie above the inteſtines, and are filled with a gummy fluid, of a marigold colour. This is the ſubſtance of which the threads are formed; and the little animal is furniſhed with a ſurpriſing apparatus for ſpinning it to the degree of fineneſs which its occaſions may require. This inſtrument in ſome meaſure reſembles a wire-drawer's machine, in which gold or ſilver threads are drawn to any degree of minuteneſs; and through this the animal draws its thread with great aſſiduity. As every thread proceeds from two gum bags, it is probable that each ſupplies its own; which, however, are

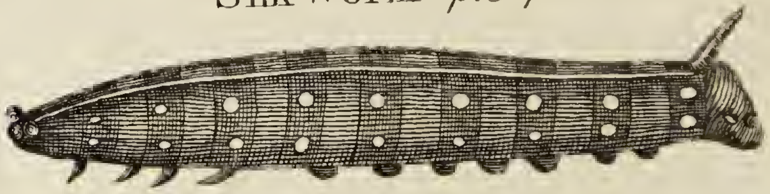
Plate.104.

Silk Worm Moth *p.343.*



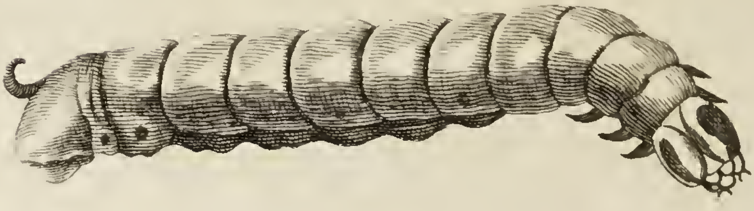
Silk Worm
in the Cone p.342.

Silk Worm *p.342.*



the case inclosing the Moth of the
Silk Worm *p.342.*

Silk Worm *in another State p.342.*



are united, as they proceed from the animal's body. If we examine the thread with a microſcope, it will be found that it is flatted on each ſide, and grooved along its length: whence we may infer, that it is doubled juſt upon leaving the body; and that the two threads ſtick to each other by that gummy quality of which they are poſſeſſed. Previous to ſpinning its web, the ſilkworm ſeeks out ſome convenient place to erect its cell, without any obſtruction. When it has found a leaf, or a chink fitted to its purpoſe, it begins to wreathe its head in every direction, and faſtens its thread on every ſide to the ſides of its retreat. Though all its firſt eſſays ſeem perfectly confuſed, yet they are not altogether without deſign; there appears indeed, no order or contrivance in the diſpoſal of its firſt threads; they are by no means laid artfully over each other, but are thrown out at random, to ſerve as an external ſhelter againſt rain; for nature having appointed the animal to work upon trees in the open air, its habits remain, though it is brought up in a warm apartment.

Malpighi pretends to have obſerved ſix different layers in a ſingle cone of ſilk: but what may eaſily be obſerved is, that it is compoſed externally of a kind of rough cotton-like ſubſtance, which is called floſs; within the thread is more diſtinct and even; and next the body of the aurelia, the apartment ſeems lined with a ſubſtance of the hardneſs of paper, but of a much ſtronger conſiſtence. It muſt not be ſuppoſed, that the thread which goes to compoſe the cone, is rolled round, as we roll a bottom; on the contrary, it lies upon it in a very irregular manner, and winds off now from one ſide of the cone, and then from the other. This whole thread, if meaſured, will be found about 300 yards long: and ſo very fine, that eight or ten of them are generally rolled off into one by the manufacturers. The cone, when completed, is in form like a pigeon's egg, and more pointed at one end than the other; at the ſmaller end, the head of the aurelia is generally found: and this is the place that the inſect, when converted into a moth, is generally ſeen to burſt through.

It is generally a fortnight or three weeks before the aurelia is changed into a moth (See pl. CIV.) but no ſooner is the winged inſect completely formed, than having diveſted itſelf of its aurelia ſkin, it prepares to burſt through its cone, or outward priſon: for this purpoſe it extends its head towards the point of the cone, butts with its eyes, which are rough, againſt the lining of its cell, wears it away, and at laſt puſhes forward, through a paſſage which is ſmall at firſt, but which enlarges as the animal encreaſes its efforts for emancipation; while the tattered remnants of its aurelia ſkin lie in confuſion within the cone, like a bundle of dirty linen.

The animal, when thus ſet free from its double confinement, appears exhauſted with fatigue, and ſeems produced for no other purpoſe but to tranſmit a future brood. It neither flies nor eats; there are few, however, of theſe animals ſuffered to come to a ſtate of maturity; for as their burſting through the cone deſtroys the ſilk, the manufacturers take care to kill the aurelia, by expoſing it to the ſun, before the moth comes to perfection. This done, they take off the floſs, and throw the cones into warm water, ſtirring them till the firſt thread offers them a clue for winding all off. They generally take eight of the ſilken threads together; the cones ſtill kept under water, till a proper quantity of the ſilk is wound off: however, they do not take all; for the latter parts grow weak, and are of a bad colour. As to the paper-like ſubſtance which remains, ſome ſtain it with a variety of colours, to make artificial flowers; others let it lie in the water, till the glutinous matter which cements it is all diſſolved: it is then carded like wool, ſpun with a wheel, and converted into ſilk ſtuffs of an inferior kind.

CHAP. XXXVIII.

Of the fourth order of Inſects—The BEE*—Foreign Bees—The Humble Bee—The Wood Bee—The Maſon Bee—The Ground Bee—The Leaf-cutting Bee—The Wall Bee—The* WASP*—The Solitary Waſp—The* ICHNEUMON FLY*—The* ANT*—The white, green and black Ants—The* BEETLE*—The May Bug—The Tumble-dung—The King of the Beetles—The Elephant Beetle—The Glow-worm—The Cantharides—The Kermes—The Cochineal—The Gall Inſect— The* GNAT*—The* TIPULA.

IN the foregoing part we treated of caterpillars changing into butterflies; in the preſent will be given the hiſtory of grubs changing into their correſponding winged animals. Theſe, like the former, undergo their transformation, and appear as grubs or maggots, as aurelias, and at laſt as winged inſects.

Some of theſe have four tranſparent wings, as bees; ſome have two membraneous caſes to their wings, as beetles; and ſome have but two wings, which are tranſparent, as ants.

THE BEE.] Of this inſect the account given us by Reaumur is ſufficiently minute; and, if true, ſufficiently wonderful: but many of the facts which he relates, were doubted by thoſe who are moſt converſant with bees; and ſome of them actually declared not to have a real exiſtence in nature.

It is unfortunate, therefore, for thoſe whoſe method demands an hiſtory of bees, that they are unfurniſhed with thoſe materials which have induced ſo many obſervers to contradict ſo great a naturaliſt. His life was ſpent in the contemplation; and it requires an equal ſhare of attention, to prove the error of his diſcoveries. Without entering, therefore, into the diſpute, we will take him for our guide; and juſt mention thoſe particulars in which ſucceeding obſervers have begun to think him erroneous.

There are three different kinds of bees in every hive. Firſt, the labouring bees, which make up the far greateſt number, and are thought to be neither male or female, but merely born for the purpoſes of labour, and continuing the breed, by ſupplying the young with proviſion, while yet in their helpleſs ſtate. The ſecond ſort are the drones; they are of a darker colour, longer, and more thick by one third than the former: they are ſuppoſed to be the males; and there is not above a hundred of them, in a hive of ſeven or eight thouſand bees. The third ſort, are ſtill fewer in number: ſome aſſert, that there is not above one in every ſwarm; but this later obſervers affirm not to be true, there being ſometimes five or ſix in the ſame hive. Theſe are called queen-bees, and are ſaid to lay all the eggs from which the whole ſwarm is hatched in the ſeaſon.

In examining the ſtructure of the common working bee, the firſt remarkable part that offers is the trunk, which ſerves to extract the honey from flowers. It is not formed, like that of other flies, in the manner of a tube, by which the fluid is to be ſucked up; but like a beſom, to ſweep, or a tongue, to lick it away. The animal is furniſhed alſo with teeth, which ſerve it in making wax, which is alſo gathered from flowers, like honey. In the thighs of the hind legs there are two cavities, edged with hair; and into theſe, as into a baſket, the animal ſticks its pellets. Thus employed, the bee flies from flower to flower, encreaſing its ſtore, and adding to its ſtock of wax; until the ball, upon each thigh, becomes as big as a grain of pepper: by this time, having got a ſufficient load, it returns, making the beſt of its way to the hive.

The belly of the bee is divided into ſix rings, which ſometimes ſhorten the body, by ſlipping one over the other. It contains within it, beſide the inteſtines, the honey-bag, the venom-bag, and the ſting. The honey-bag is as tranſparent as cryſtal, containing the honey that the bee has bruſhed from the flowers; of which the greater part is carried to the hive, and poured into the cells of the honey-comb: while the remainder ſerves for the bee's own nouriſhment: for, during ſummer, it never touches what has been laid up for the winter. The ſting, which ſerves to defend this little animal from its enemies, is compoſed of three parts; the ſheath, and two darts, which are extremely ſmall and penetrating. Both the darts have ſeveral ſmall points or barbs, like thoſe of a fiſh-hook, which renders the ſting more painful, and makes the darts rankle in the wound. Still, however, this inſtrument would be very ſlight, did not the bee poiſon the wound. The ſheath, which has a ſharp point, makes the firſt impreſſion; which is followed by that of the darts, and then the venomous liquor is poured in. The ſheath ſometimes ſticks ſo faſt in the wound, that the animal is obliged to leave it behind; by which the bee ſoon after dies, and the wound is conſiderably enflamed. It might at firſt appear well for mankind, if the bee were without its ſting: but, upon recollection, it will be found that the little animal would then have too many rivals in ſharing its labours. An hundred other lazy animals, fond of honey, and hating labour, would intrude upon the ſweets of the hive; and the treaſure would be carried off, for want of armed guardians to protect it.

From examining the bee ſingly, we now come to conſider it in ſociety, as an animal not only ſubject to laws, but active, vigilant, laborious, and diſintereſted. All its proviſions are laid up for the community; and all its arts in building a cell, deſigned for the benefit of poſterity. The ſubſtance with which bees build their cells is wax; which is faſhioned into convenient apartments for themſelves and their young. When they begin to work in their hives, they divide themſelves into four companies: one of which roves in the fields in ſearch of materials; another employs itſelf in laying out the bottom and partitions of their cells; a third is employed in making the inſide ſmooth from the corners and angles; and the fourth company bring food for the reſt, or relieve thoſe who return with their reſpective burthens. But they are not kept conſtant to one employment; they often change the taſks aſſigned them; thoſe that have been at work, being permitted to go abroad; and thoſe that have been in the fields already, take their places. They ſeem even to have ſigns, by which they underſtand each other; for when any of them wants food, it bends down its trunk to the bee from whom it is expected, which then opens its honey-bag, and lets ſome drops fall into the other's mouth, which is at that time opened to receive it. Their diligence and labour is ſo great, that, in a day's time, they are able to make cells, which lie upon each other, numerous enough to contain three thouſand bees.

If we examine their cells, they will be found formed in the exacteſt proportion. It was ſaid by Pappus, an ancient geometrician, that, of all figures, hexagons were the moſt convenient; for, when placed touching each other, the moſt convenient room would be given, and the ſmalleſt loſt. The cells of the bees are perfect hexagons: theſe, in every honey-comb, are double, opening on either ſide, and cloſed at the bottom. The bottoms are compoſed of little triangular panes, which, when united together, terminate in a point, and lie exactly upon the extremities of other panes of the ſame ſhape, in oppoſite cells. Theſe lodgings have ſpaces, like ſtreets, between them, large enough to give the bees a free paſſage in and out; and yet narrow enough to preſerve the neceſſary heat. The mouth of every cell is defended by a border, which makes the door a little leſs than the inſide of the cell, which ſerves to ſtrengthen the whole. Theſe cells ſerve for different purpoſes: for laying up their young; for their wax, and for their honey, which makes their principal ſubſiſtence.

It is well known that the habitation of bees ought to be very cloſe; and what their hives want, from the negligence or unſkilfulneſs of man, theſe animals ſupply by their own induſtry: ſo that it is their principal care, when firſt hived, to ſtop up all the crannies. For this purpoſe, they make uſe of a reſinous gum, which is more tenacious than wax, and differs greatly from it. This the ancients called Propolis: it will grow conſiderably hard in June; though it will in ſome meaſure ſoften by heat; and is often found different in conſiſtence, colour, and ſmell. It has generally an agreeable aromatic odour when it is warmed; and by ſome it is conſidered as a moſt grateful perfume. When the bees begin to work with it, it is ſoft, but it acquires a firmer conſiſtence every day; till at length it aſſumes a brown colour, and becomes much harder than wax. The bees carry it on their hinder legs; and ſome think it is met with on the birch, the willow, and poplar. However it is procured, it is certain that they plaiſter the inſide of their hives with this compoſition.

If examined through a glaſs hive, from the hurry the whole ſwarm is in, the whole at firſt appears like anarchy and confuſion: but the ſpectator ſoon finds every animal diligently employed, and following one purſuit, with a ſettled purpoſe. Their teeth are the inſtruments by which they model and faſhion their various buildings, and give them ſuch ſymmetry and perfection. They begin at the top of the hive; and ſeveral of them work at a time, at the cells which have two faces. If they are ſtinted with regard to time, they give the new cells but half the depth which they ought to have; leaving them imperfect, till they have ſketched out the number of cells neceſſary for the preſent occaſion. The conſtruction of their combs, coſts them a great deal of labour: they are made by inſenſible additions; and not caſt at once in a mold. There ſeems no end of their ſhaping, finiſhing, and turning them neatly up. The cells for their young are moſt carefully formed; thoſe deſigned for lodging the drones, are larger than the reſt; and that for the queen-bee, the largeſt of all. Honey is not the only food upon which theſe animals ſubſiſt. The meal of flowers, of which their wax is formed, is one of their moſt favourite repaſts. This is a diet which they live upon during the ſummer, and of which they lay up a large winter proviſion. The wax of which their combs are made, is no more than this meal digeſted, and wrought into a paſte. When the flowers upon which bees generally feed, are not fully blown, and this meal or duſt is not offered in ſufficient quantities, the bees pinch the tops of the ſtamina in which it is contained, with their teeth; and thus anticipate the progreſs of vegetation. In April and May, the bees are buſy, from morning to evening, in gathering this meal; but when the weather becomes too hot in the midſt of ſummer, they work only in the morning.

The bee is furniſhed with a ſtomach for its wax, as well as its honey. In the former of the two, their powder is altered, digeſted and concocted into real wax; and is thus ejected by the ſame paſſage by which it was ſwallowed. Every comb, newly made, is white: but it becomes yellow as it grows old, and almoſt black when kept too long in the hive. Beſide the wax thus digeſted, there is a large portion of the powder kneaded up for food in every hive, and kept in ſeparate cells, for winter proviſion. This is called, by the country people, bee-bread; and contributes to the health and ſtrength of the animal during winter. Thoſe who rear bees, may rob them of their honey, and feed them, during the winter, with treacle; but no proper ſubſtitute has yet been found for the bee-bread; and without it, the animals become conſumptive and die.

How numerous ſoever the multitude of bees may appear in one ſwarm, they all owe their original to a ſingle parent, which is called the queen-bee. It is indeed ſurpriſing that a ſingle inſect ſhall, in one ſummer, give birth to above twenty thouſand young: but, upon opening her body, the wonder will ceaſe; as the number of eggs appearing, at one time, amounts to five thouſand. This animal, whoſe exiſtence is of ſuch importance

tance to her ſubjects, may eaſily be diſtinguiſhed from the reſt, by her ſize, and the ſhape of her body. On her ſafety depends the whole welfare of the commonwealth; and the attentions paid her by all the reſt of the ſwarm, evidently ſhew the dependence her ſubjects have upon her ſecurity. If this inſect be carefully obſerved, ſhe will be ſeen at times attended with a numerous retinue, marching from cell to cell, plunging the extremity of her body into many of them, and leaving a ſmall egg in each.

The bees which generally compoſe her train, are thought to be males, which ſerve to impregnate her by turns. Theſe are larger and blacker than the common bees; without ſtings, and without induſtry. They ſeem formed only to tranſmit a poſterity. It muſt be obſerved, however, that all this fertility of the queen-bee, and the great attentions paid to her by the reſt, are controverted by more recent obſervers. They aſſert, that the common bees are parents themſelves; that they depoſit their eggs in the cells which they have prepared; that the females are impregnated by the males, and bring forth a progeny, which is wholly their own.

The egg is fixed to the bottom of the cell, and touches it but in a ſingle point. A day or two after it is depoſited, the worm is excluded from the ſhell of the egg, having the appearance of a maggot rolled up in a ring, and lying ſoftly on a bed of a whitiſh coloured jelly; upon which alſo the little animal begins to feed. In the mean time, the inſtant it appears, the working bees attend it with the moſt anxious and parental tenderneſs. Thus attended, and plentifully fed, the worm, in leſs than ſix days time, comes to its full growth, and no longer accepts the food offered it. When the bees perceive that it has no further occaſion for feeding, they perform the laſt offices of tenderneſs, and ſhut the little animal up in its cell; walling up the mouth of its apartment with wax: there they leave the worm to itſelf; having ſecured it from every external injury.

The worm is no ſooner left encloſed, but, from a ſtate of inaction, it begins to labour, extending and ſhortening its body; and by this means lining the walls of its apartment with a ſilken tapeſtry, which it ſpins in the manner of caterpillars, before they undergo their laſt transformation. When their cell is thus prepared, the animal is ſoon after transformed into an aurelia; but differing from that of the common caterpillar, as it exhibits not only the legs, but the wings of the future bee, in its preſent ſtate of inactivity. Thus, in about twenty, or one-and-twenty days after the egg was laid, the bee is completely formed, and fitted to undergo the fatigues of its ſtate. When all its parts have acquired their proper ſtrength and conſiſtence, the young animal opens its priſon, by piercing with its teeth the waxen door that confines it. When juſt freed from its cell, it is as yet moiſt, and incommoded with the ſpoils of its former ſituation; but the officious bees are ſoon ſeen to flock round it, and to lick it clean on all ſides with their trunks; while another band, with equal aſſiduity, are obſerved to feed it with honey: others again begin immediately to cleanſe the cell that has been juſt left; to carry the ordures out of the hive, and to fit the place for a new inhabitant. The young bee ſoon repays their care, by its induſtry; for as ſoon as ever its external parts become dry, it diſcovers its natural appetites for labour, and induſtriouſly begins the taſk, which it purſues unremittingly through life. The toil of man is irkſome to him, and he earns his ſubſiſtence with pain; but this little animal ſeems happy in its purſuits, and finds delight in all its employments.

When bees firſt begin to break their priſons, there are generally above a hundred excluded in one day. Thus, in the ſpace of a few weeks, the number of the inhabitants in one hive, of moderate ſize, becomes ſo great, that there is no place to contain the new comers; and they are ſcarcely excluded from the cell, when they are obliged, by the old bees, to ſally forth in queſt of new habitations. In other words, the hive begins to ſwarm, and the new progeny prepares for exile.

While there is room enough in the hive, the bees remain quietly together; it is neceſſity alone that compels the ſeparation. Sometimes, indeed, the young brood, with graceleſs obſtinacy, refuſe to depart, and even venture to reſiſt their progenitors. The young ones are known by being browner than the old, with whiter hair; the old ones are of a lighter colour, with red hair. The two armies are therefore eaſily diſtinguiſhable, and dreadful battles are often ſeen to enſue. But the victory almoſt ever terminates with ſtrict poetical juſtice in favour of the veterans, and the rebellious offspring are driven off, not without loſs and mutilation.

In different countries, the ſwarms make their appearance at different times of the year, and there are ſeveral ſigns previous to this intended migration. The night before, an unuſual buzzing is heard in the hive; in the morning, though the weather be ſoft and inviting, they ſeem not to obey the call, being intent on more important meditations within. All labour is diſcontinued in the hive, every bee is either employed in forcing, or reluctantly yielding a ſubmiſſion; at length, after ſome noiſe and tumult, a queen-bee is choſen, to guard, rather than conduct, the young colony to other habitations, and then they are marſhalled without any apparent conductor. In leſs than a minute, they leave their native abode, and forming a cloud round their protectreſs, they ſet off, without ſeeming to know the place of their deſtination; *The world before them, where to chuſe their place of reſt.* The uſual time of ſwarming, is from ten in the morning, to three in the afternoon, when the ſun ſhines bright, and invites them to ſeek their fortunes. They flutter for a while, in the air, like flakes of ſnow, and ſometimes undertake a diſtant journey, but more frequently are contented with ſome neighbouring aſylum; the branch of a tree, a chimney top, or ſome other expoſed ſituation. It ſometimes is found, that there are two or three queens to a ſwarm, and the colony is divided into parties; but it moſt uſually happens, that one of theſe is more conſiderable than the other, and the bees by degrees, deſert the weakeſt, to take ſhelter under the moſt powerful protector. The deſerted queen does not long ſurvive this defeat: ſhe takes refuge under the new monarch, and is ſoon deſtroyed by her jealous rival. Till this cruel execution it performed, the bees never go out to work; and if there ſhould be a queen bee, belonging to the new colony, left in the old hive, ſhe always undergoes the fate of the former. However, it muſt be obſerved, that the bees never ſacrifice any of their queens, when the hive is full of wax and honey; for there is at that time, no danger in maintaining a plurality of breeders.

When the ſwarm is thus conducted to a place of reſt, and the policy of government is ſettled, the bees ſoon reſume their former labours. The making cells, ſtoring them with honey, impregnating the queen, making proper cells for the reception of the riſing progeny, and protecting them from external danger, employ their unceaſing induſtry. But ſoon after, and towards the latter end of ſummer, when the colony is ſufficiently ſtored with inhabitants, a moſt cruel policy enſues. The drone bees, which are (as has been ſaid) generally in a hive, to the number of a hundred, are marked for ſlaughter. Theſe, which had hitherto led a life of indolence and pleaſure, whoſe only employment was in impregnating the queen, and rioting upon the labours of the hive, without aiding in the general toil, now ſhare the fate of moſt voluptuaries, and fall a ſacrifice to the general reſentment of ſociety.

When a hive ſends out ſeveral ſwarms in the year, the firſt is always the beſt, and the moſt numerous. Theſe having the whole ſummer before them, have the more time for making wax and honey, and conſequently their labours are the moſt valuable to the proprietor. Although the ſwarm chiefly conſiſts of the youngeſt bees, yet it is often found, that bees of all ages compoſe the multitude of emigrants, and it often happens, that bees of all ages are ſeen remaining behind. The number of them is always more conſiderable than that of ſome populous cities, for ſometimes upwards of forty thouſand are found in a ſingle hive. So large a body may well be ſuppoſed to work with great expedition; and in fact, in leſs than twenty-four hours, they will make combs above twenty inches long, and ſeven or eight broad. Sometimes they will half fill their hives with wax, in leſs than five days. In the firſt fifteen days, they are always found to make more wax than they do afterwards during the reſt of the year.

A farm, or a country, may be over-ſtocked with bees; as with any other ſort of animal; for a certain number of hives always require a certain number of flowers to ſubſiſt on. When the flowers near home are rifled, then are theſe induſtrious inſects ſeen taking more extenſive ranges, but their abilities may be over taxed; and if they are obliged, in queſt of honey, to go too far from home, they are overwearied in the purſuit, they are devoured by birds, or beaten down by the winds and rain.

From a knowledge of this, in ſome parts of France and Piedmont, they have contrived a kind of floating bee-houſe.

They have on board one barge, threeſcore or an hundred bee-hives, well defended from the inclemency of an accidental ſtorm; and with theſe, the owners ſuffer themſelves to float gently down the river. As the bees are continually chooſing their flowery paſture along the banks of the ſtream, they are furniſhed with ſweets before unrified; and thus a ſingle floating bee-houſe, yields the proprietor a conſiderable income. Bees gather two kinds of wax, one coarſe and the other fine. The coarſer ſort is bitter, and with this, which is called propolis, they ſtop up all the holes and crevices of their hives. It is of a more reſinous nature than the fine wax, and is conſequently better qualified to reſiſt the moiſture of the ſeaſon, and preſerve the works warm and dry within. The fine wax is as neceſſary to the animals preſervation as the honey itſelf. With this they make their lodgings, with this they cover the cells of their young, and in this they lay up their magazines of honey.

As of wax, there are alſo two kinds of honey. The white and the yellow. The white is taken without fire from the honey-combs. The yellow is extracted by heat, and ſqueezed through bags, in a preſs. The beſt honey is new, thick, and granulated, of a clear tranſparent white colour, of a ſoft and aromatic ſmell, and of a ſweet lively taſte. Honey made in mountainous countries, is preferable to that of the valley. The honey made in the ſpring, is more highly eſteemed, than that gathered in ſummer, which laſt is ſtill more valuable than that of autumn, when the flowers begin to fade and loſe their fragrance.

The bees are nearly alike in all parts of the world, yet there are differences worthy our notice. In Guadaloupe, the bee is leſs by one half than the European, and more black and round. They have no ſting, and make their cells in hollow trees; where, if the hole they meet with is too large, they form a ſort of waxen houſe, of the ſhape of a pear, and in this they lodge and ſtore their honey, and lay their eggs. They lay up their honey in waxen veſſels, of the ſize of a pigeon's egg, of a black or deep violet colour; and theſe are ſo joined together, that there is no ſpace left between them. The honey never congeals, but is fluid, of the conſiſtence of oil, and the colour of amber. Reſembling theſe, there are found little black bees, without a ſting, in all the tropical climates; and though theſe countries are replete with bees, like our own, yet thoſe form the moſt uſeful and laborious tribe in that part of the world. The honey they produce, in neither ſo unpalatable, nor ſo ſurfeiting as ours; and the wax is ſo ſoft, that it is only uſed for medicinal purpoſes, it being never found hard enough to form into candles, as in Europe.

Of inſects that receive the name of bees, among us, there are ſeveral; which, however, differ very widely from that induſtrious ſocial race we have been juſt deſcribing. The *Humble-bee* is the largeſt of all this tribe, being as large as the firſt joint of one's middle finger. Theſe are ſeen in every field, and perched on every flower. They build their neſt in holes in the ground, of dry leaves, mixed with wax and wool, defended with moſs from the weather. Each humble-bee makes a ſeparate cell, about the ſize of a ſmall nutmeg, which is round and hollow, containing the honey in a bag. Several of theſe cells are joined together, in ſuch a manner, that the whole appears like a cluſter of grapes. The females, which have the appearance of waſps, are very few, and their eggs are laid in cells, which the reſt ſoon cover over with wax. It is uncertain whether they have a queen or not; but there is one much larger than the reſt, without wings, and without hair, and all over black, like poliſhed ebony. This goes and views all the works, from time to time, and enters into the cell, as if it wanted to ſee whether every thing was done right: in the morning, the young humble-bees are very idle, and ſeem not at all inclined to labour, till one of the largeſt, about ſeven o'clock, thruſts half its body from a hole, deſigned for that purpoſe, and ſeated on the top of the neſt, beats its wings for twenty minutes ſucceſſively, buzzing the whole time, till the whole colony is put in motion. The humble-bees gather honey, as well as the common bees; but it is neither ſo fine, nor ſo good, nor the wax ſo clean, or ſo capable of fuſion.

Beſide the bees already mentioned, there are various kinds among us, that have much the appearance of honey-makers, and yet make only wax. The *Wood-bee* is ſeen in every garden. It is rather larger than the common queen-bee; its body of a blueiſh black, which is ſmooth and ſhining. It begins to appear at the approach of ſpring, and is ſeen flying near walls expoſed to a ſunny aſpect. This bee makes its neſt in ſome piece of wood, which it contrives to ſcoop and hollow for its purpoſe. This, however, is never done in trees that are ſtanding, for the wood it makes choice of is half rotten. The holes are not made directly forward, but turning to one ſide, and have an opening ſufficient to admit one's middle finger; whence runs the inner apartment, generally twelve or fifteen inches long. The inſtruments uſed in boring theſe cavities, are their teeth; the cavity is uſually branched into three or four apartments; and in each of theſe they lay their eggs, to the number of ten or twelve, each ſeparate and diſtinct from the reſt. The egg is involved in a ſort of paſte, which ſerves at once for the young animal's protection and nouriſhment. The grown bees, however, feed upon ſmall inſects, particularly

a louſe,

a louſe, of a reddiſh brown colour, of the ſize of a ſmall pin's head.

Maſon-bees make their cells with a ſort of mortar, made of earth, which they build againſt a wall that is expoſed to the ſun. The mortar, which at firſt is ſoft, ſoon becomes as hard as ſtone, and in this their eggs are laid. Each neſt contains ſeven or eight cells, an egg in every cell, placed regularly one over the other. If the neſt remains unhurt, or wants but little repairs, they make uſe of them the year enſuing: and thus they often ſerve three or four years ſucceſſively. From the ſtrength of their houſes, one would think theſe bees in perfect ſecurity, yet none are more expoſed than they. A worm with very ſtrong teeth, is often found to bore into their little fortifications, and devour their young.

The *Ground-bee* builds its neſt in the earth, wherein they make round holes, five or ſix inches deep; the mouth being narrow, and only juſt ſufficient to admit the little inhabitant. It is amuſing enough, to obſerve the patience and aſſiduity with which they labour. They carry out all the earth, grain by grain, to the mouth of the hole, where it forms a little hillock, an Alps compared to the power of the artiſt by which it was raiſed. Sometimes the walks of a garden are found undermined by their labours; ſome of the holes running directly downward, others horizontally beneath the ſurface. They lay up in theſe cavities proviſions for their young, which conſiſt of a paſte that has the appearance of corn, and is of a ſweetiſh taſte.

The *Leaf-cutting Bees* make their neſt and lay their eggs among bits of leaves, very artificially placed in holes in the earth, of about the length of a tooth-pick caſe. They make the bits of leaves of a roundiſh form, and with them line the inſide of their habitations. This tapeſtry is ſtill further lined by a reddiſh kind of paſte, ſomewhat ſweet or acid. Theſe bees are of various kinds; thoſe that build their neſts with cheſnut-leaves are as big as drones, but thoſe of the roſe-tree are ſmaller than the common bee.

The *Wall bees* are ſo called becauſe they make their neſts in walls, of a kind of ſilky membrane with which they fill up the vacuities between the ſmall ſtones which form the ſides of their habitation. Their apartment conſiſts of ſeveral cells, placed end to end, each in the ſhape of a woman's thimble. Though the web which lines this habitation is thick and warm, yet it is tranſparent and of a whitiſh colour. This ſubſtance is ſuppoſed to be ſpun from the animal's body; the males and females are of a ſize, but the former are without a ſting. To theſe varieties of the bee kind might be added ſeveral others which are all different in nature, but not ſufficiently diſtinguiſhed to excite curioſity.

THE WASP is well known to be a winged inſect with a ſting. To be longer in proportion to its bulk than the bee, to be marked with bright yellow circles round its body, and to be the moſt ſwift and active inſect of all the fly kind. On each ſide of the mouth this animal is furniſhed with a long tooth, notched like a ſaw, and with theſe it is enabled to cut any ſubſtance, not omitting meat itſelf, and to carry it to its neſt. Waſps live like bees in community, and ſometimes ten or twelve thouſand are found inhabiting a ſingle neſt.

Of all inſects the waſp is the moſt fierce, voracious, and moſt dangerous, when enraged. They are ſeen wherever fleſh is cutting up, gorging themſelves with the ſpoil, and then flying to their neſts with their reeking prey. They make war alſo on every other fly, and the ſpider himſelf dreads their approaches.

Every community among bees is compoſed of females or queens, drones or males, and neutral or working bees. Waſps have ſimilar occupations; the two firſt are for propagating the ſpecies, the laſt for nurſing, defending and ſupporting the riſing progeny. Among bees, however, there is ſeldom above a queen or two in a hive; among waſps there are above two or three hundred.

As ſoon as the ſummer begins to invigorate the inſect tribes, the waſps are the moſt of the number, and diligently employed either in providing proviſions for their neſt, if already made, or in making one, if the former habitation be too ſmall to receive the encreaſing community. The neſt (See pl. CV.) is one of the moſt curious objects in Natural Hiſtory, and contrived almoſt as artificially as that of the bees themſelves. Their principal care is to ſeek out a hole that has been begun by ſome other animal, a field mouſe, a rat, or a mole, to build their neſts in. They ſometimes build upon the plain, where they are ſure of the dryneſs of their ſituation, but moſt commonly on the ſide of a bank, to avoid the rain or water that would otherwiſe annoy them. When they have choſen a proper place they go to work with wonderful aſſiduity. Their firſt labour is to enlarge and widen the hole, taking away the earth and carrying it off to ſome diſtance. To prevent the earth from falling down and cruſhing their riſing city into ruin, they make a ſort of roof with their gluey ſubſtance, to which they begin to fix the rudiments of their building, working from the top downwards, as if they were hanging a bell, which, however, at length, they cloſe up at the bottom. The materials with which they build their neſts, are bits of wood and glue. The wood they get where they can from the rails and poſts which they meet with in the fields and elſewhere. Theſe they ſaw and divide into a multitude of ſmall fibres, of which they take up little bundles in their claws, letting fall upon them a few drops of gluey matter with which their bodies are provided, by the help of which they knead the whole compoſition into a paſte, which ſerves them in their future building. When they have returned with this to the neſt, they ſtick their load of paſte on that part where they make their walls and partitions; they tread it cloſe with their feet, and trowel it with their trunks, ſtill going backwards as they work. Having repeated this operation three or four times, the compoſition is at length flatted out until it becomes a ſmall leaf of a grey colour, much finer than paper, and of a pretty firm texture. This done, the ſame waſp returns to the field to collect a ſecond load of paſte, repeating the ſame ſeveral times, placing layer upon layer, and ſtrengthening every partition in proportion to the wants or convenience of the general fabric. Other working waſps come quickly after to repeat the ſame operation, laying more leaves upon the former, till at length, after much toil, they have finiſhed the large roof which is to ſecure them from the tumbling in of the earth. This dome being finiſhed, they make another entrance to their habitation, deſigned either for letting in the warmth of the ſun, or for eſcaping in caſe one door be invaded by plunderers. Certain however it is, that by one of theſe they always enter, by the other they ſally forth to their toil; each hole being ſo ſmall that they can paſs but one at a time. The walls being thus compoſed, and the whole ſomewhat of the ſhape of a pear, they labour at their cells which they compoſe of the ſame paper-like ſubſtance that goes to the formation of the outſide works. Their combs differ from thoſe of bees, not leſs in the compoſition than the poſition which they are always ſeen to obtain. The honey-comb of the bee is edgeways with reſpect to the hive; that of the waſp is flat, and the mouth of every cell opens downwards. Thus is their habitation, contrived ſtory above ſtory, ſupported by ſeveral rows of pillars which give firmneſs to the whole building, while the upper ſtory is flat-roofed, and as ſmooth as the pavement of a room, laid with ſquares of marble. The waſps can freely walk upon theſe ſtories between the pillars to do whatever their wants require. The pillars are very hard and compact, being larger at each end than in the middle, not much unlike the columns of a building. All the cells of the neſts are only deſtined for the reception of the young, being replete with neither wax nor honey (See pl. CV.)

Each cell is like that of the bee, hexagonal; but there are of two ſorts, the one larger, for the production of the male and female waſps, the other leſs, for the reception of the working part of the community. When the females are impregnated by the males, they lay their eggs, one in each cell, and ſtick it in with a kind of gummy matter to prevent its falling out. From this egg proceeds the inſect in its worm-ſtate, of which the old ones are extremely careful. But the waſp community differs from that of the bee in this; that among the latter the working bees take the parental duties upon them, whereas among the waſps the females alone are permitted to feed their young, and to nurſe their riſing progeny. For this purpoſe the female waits with great patience till the working waſps have brought in their proviſions, which ſhe takes from them, and cuts into pieces. She then goes with great compoſure from cell to cell, and feeds every young one with her mouth. When the young worms have come to a certain ſize they leave off eating, and begin to ſpin a very fine ſilk, fixing the firſt end to the entrance of the cell, then turning their heads, firſt on one ſide, then on the other, they fix the thread to different parts, and thus they make a ſort of a door which ſerves to cloſe up the mouth of the cell. After this they diveſt themſelves of their ſkins after the uſual mode of transformation, the aurelia by degrees begins to emancipate itſelf from its ſhell: by little and little it thruſts out its legs and wings, and inſenſibly acquires the colour and ſhape of its parent.

The waſp thus formed, and prepared for depredation, becomes a bold, troubleſome, and dangerous inſect: there are no dangers which it will not encounter in purſuit of its prey, and nothing ſeems to ſatiate its gluttony. Though it can gather no honey of its own, no animal is more fond of ſweets. For this purpoſe, it will purſue the bee and the humble-bee, deſtroy them with its ſting, and then plunder them of their honey-bag, with which it flies triumphantly loaded to its neſt to regale its young. Waſps are ever fond of making their neſts in the neighbourhood of bees, merely to have an opportunity of robbing their hives, and feaſting on the ſpoil. Yet the bees are not found always patiently ſubmiſſive to their tyranny, but fierce battles are ſometimes ſeen to enſue, in which the bees make up by conduct and numbers what they want in perſonal prowefs. When there is no honey to be had, they ſeek for the beſt and ſweeteſt fruits, and they are never miſtaken in their choice. From the garden they fly to the city, to the grocers ſhops, and butchers ſhambles. They will ſometimes carry off bits of fleſh half as big as themſelves, with which they fly to their neſt for the nouriſhment of their brood. Thoſe who cannot drive them away, lay for them a piece of ox's liver, which being without fibres, they prefer to other fleſh; and whenever they are found, all other flies are ſeen to deſert the place immediately. Such is the dread with which theſe little animals impreſs all the reſt of the inſect tribes, which they ſeize and devour without mercy, that they vaniſh at their approach. Wherever they fly, like the eagle or the falcon, they form a deſert in the air around them. In this manner the ſummer is paſſed in plundering the neighbourhood, and rearing up their young; every day adds to their numbers; and from their ſtrength, agility, and indiſcriminate appetite for every kind of proviſion, were they as long lived as the bee, they would ſoon ſwarm upon the face of nature, and become the moſt noxious plague of man: but providentially their lives are meaſured to their miſchief, and they live but a ſingle ſeaſon. In proportion as the cold of the winter encreaſes, they are ſeen to become more domeſtic; they ſeldom leave the neſt, they make but ſhort adventures from home, they flutter about in the noon-day heats, and ſoon after return chilled and feeble.

As their calamities encreaſe, new paſſions ſoon begin to take place; the care for poſterity no longer continues, and as the parents are no longer able to provide their growing progeny a ſupply, they take the barbarous reſolution of ſacrificing them all to the neceſſity of the times. In this manner, like a garriſon upon ſhort allowance, all the uſeleſs hands are deſtroyed; the young worms, which a little before they fed and protected with ſo much aſſiduity, are now butchered and dragged from their cells. As the cold encreaſes they no longer find ſufficient warmth in their neſts, which grow hateful to them, and they fly to ſeek it in the corners of houſes, and places that receive an artificial heat. But the winter is ſtill inſupportable; and, before, the new year begins, they wither and die; the working waſps firſt, the males ſoon following, and many of the females ſuffering in the general calamity. In every neſt, however, one or two females ſurvive the winter, and having been impregnated by the male during the preceding ſeaſon, ſhe begins in ſpring to lay her eggs in a little hole of her own contrivance. This bundle of eggs, which is cluſtered together like grapes, ſoon produces two worms which the female takes proper precaution to defend and ſupply, and theſe when hatched ſoon give aſſiſtance to the female, who is employed in hatching two more; theſe alſo gathering ſtrength, extricate themſelves out of the web that encloſed them; and become likewiſe aſſiſtants to their mother: fifteen days after, two more make their appearance; thus is the community every day encreaſing, while the female lays in every cell, firſt a male and then a female. Theſe ſoon after become breeders in turn, till, from a ſingle female, ten thouſand waſps are ſeen produced before the month of June.

The *Hornet* is one of the largeſt and moſt remarkable ſpecies of the waſp. It is twice as large as the common waſp, and is alſo diſtinguiſhed by a black breaſt, and double black ſpots on the belly; the head is alſo longer and ſlenderer, and the eyes ſomewhat reſembling a half moon. It is extremely bold and venomous. Its predominant paſſion is for fleſh, and when hungry two or three of them will ſeize upon a ſmall bird, kill it and devour its fleſh.—Nay, it has even been ſaid, that ſingly, it will atttack and conquer a ſparrow. In all its manners and habits, it entirely reſembles the waſps we have been deſcribing.—For the Hornet's neſt See pl. CV.

Such is the hiſtory of the ſocial waſp; but, as among bees, ſo alſo among theſe inſects, there are various tribes that live in ſolitude: theſe lay their eggs in a hole for the purpoſe, and the parent dies long before the birth of its offſpring. In the principal ſpecies of the *Solitary Waſps*, the inſect is ſmaller than the working waſp of the ſocial kind. The filament, by which the corſelet is joined to the body, is longer and more diſtinctly ſeen, and the whole colour of the inſect is blacker than in the ordinary kinds. But it is not their figure, but the manners of this extraordinary inſect that claim our principal regard.

From the end of May to the beginning of July, this waſp is ſeen moſt diligently employed. The whole purpoſe of its life ſeems to be in contriving and fitting up a commodious apartment for its young one, which is not to ſucceed it till the year enſuing. For this end, it is employed, with unwearied aſſiduity, in boring a hole into the fineſt earth ſome inches deep, but not much wider than the diameter of its own body. This is but a gallery leading to a wider apartment deſtined for the convenient lodgment of its young. As it always chooſes a gravelly ſoil to work in, and where the earth is almoſt as hard as ſtone itſelf, the digging and holowing this apartment is an enterprize of no ſmall labour; for effecting its operations, this inſect is furniſhed with two teeth, which are ſtrong and firm, but not ſufficiently hard to penetrate the ſubſtance through which it is reſolved to make its way: in order therefore to ſoften that earth which it is unable to pierce, it is furniſhed with a gummy liquor which it emits upon the place, and which renders it more eaſily ſeparable from the reſt, and the whole becoming a kind of ſoft paſte is removed to the mouth of the habitation. The animal's proviſion of liquor in theſe operations is however ſoon exhauſted; and it is then ſeen either taking up water from ſome neighbouring flower or ſtream, in order to ſupply the deficiency.

At length, after much toil, a hole ſome inches deep is formed, at the bottom of which is a large cavity; and to this no other hoſtile inſect would venture to find its way, from the length and the narrowneſs of the defile through which it would be obliged to paſs. In this the ſolitary waſp lays its egg, which is deſtined to continue the ſpecies; there the naſcent animal is to continue for above nine months, unattended and immured, and at firſt appearance the moſt helpleſs inſect of the creation. But when we come to examine, new wonders offer, no other inſect can boaſt ſo copiouſly luxurious a proviſion, or ſuch confirmed ſecurity.

As ſoon as the mother-waſp has depoſited her egg at the bottom of the hole, her next care is to furniſh it with a ſupply of proviſions, which may be offered to the young inſect as ſoon as it leaves the egg. To this end ſhe procures a number of little green worms, generally from eight to twelve, and theſe are to ſerve as food for the young one the inſtant it awakens into life. When this ſupply is regularly arranged and laid in, the old one then, with as much aſſiduity as it before worked out its hole, now cloſes the mouth of the paſſage; and thus leaving its young one immured in perfect ſecurity and with a copious ſupply of animal food, ſhe dies, ſatisfied with having provided for a future progeny.

When the young one leaves the egg it is ſcarcely viſible, and is ſeen immured among a number of inſects, infinitely larger than itſelf, ranged in proper order around it, which, however, give it no manner of apprehenſion. Whether the parent, when ſhe laid in the inſect proviſion, contrived to diſable the worms from reſiſtance, or whether they were at firſt incapable of any, is not known. Certain it is, that the young glutton feaſts upon the living ſpoil without any controul; his game lies at his hand, and he devours one after the other as the calls of appetite incite him. The life of the young animal is therefore ſpent in the moſt luxurious manner, till its whole ſtock of worms is exhauſted, and the time of its transformation begins to approach; and then ſpinning a ſilken web, it continues fixed in its cell till the ſun calls it from its dark abode the enſuing ſummer.

The waſps of Europe are very miſchievous, yet they are innocence itſelf when compared to thoſe of the tropical climates, where all the inſect tribes are not only numerous, but large, voracious, and formidable. Thoſe of the Weſt Indies are thicker, and twice as long as the common bee; they are of a grey colour, ſtriped with yellow, and armed with a very dangerous ſting. They make their cells in the manner of a honey-comb, in which the young ones are hatched and bred. They generally hang their neſts by threads, compoſed of the ſame ſubſtance with the cells, to the branches of trees, and the eaves of houſes. They are ſeen every where in great abundance, deſcending like fruit, particularly pears, of which ſhape they are, and as large as one's head. The inſide is divided into three round ſtories, full of cells, each hexagonal, like thoſe of an honey-comb. In ſome of the iſlands, theſe inſects are ſo very numerous, that their neſts are ſtuck up in this manner, ſcarce two feet aſunder, and the inhabitants are in continual apprehenſion from their accidental reſentment. It ſometimes happens, that no precautions can prevent their attacks, and the pains of their ſting is almoſt inſupportable. Thoſe who have felt it think it more terrible than even that of a ſcorpion; the whole viſage ſwells, and the features are ſo disfigured, that a perſon is ſcarcely known by his moſt intimate acquaintance.

THE ICHNEUMON FLY.] Every rank of inſects, how voracious ſoever, have enemies that are terrible to them, and that revenge upon them the injuries done upon the reſt of the animated creation. The waſp, as we have ſeen, is very troubleſome to man, and very formidable to the inſect tribe; but the ichneumon fly (of which there are many varieties) fears not the waſp itſelf, it enters its retreats, plunders its habitations, and takes poſſeſſion of that cell for its own young, which the waſp had laboriouſly built for a dearer poſterity.

This fly receives its name from the little quadruped, which is found to be ſo deſtructive to the crocodile, as it bears a ſtrong ſimilitude in its courage and rapacity; but though there are many different kinds of this inſect, yet the moſt formidable, and that beſt known, is called the common ichneumon, with four wings, like the bee, a long ſlender black body, and a three forked tail, conſiſting of briſtles; the two outermoſt black, and the middlemoſt red.

Though this inſtrument is, to all appearance, ſlender and feeble, yet it is found to be a weapon of great force and efficacy. There is ſcarcely any ſubſtance which it will not pierce; and, indeed, it is ſeldom ſeen but employed in penetration. The male is unprovided with ſuch a ſting, while the female uſes it with great force and dexterity, brandiſhing it when caught, from ſide to ſide, and very often wounding thoſe who thought they held her with the greateſt ſecurity.

All the flies of this tribe are produced in the ſame manner, and owe their birth to the deſtruction of ſome other inſect, within whoſe body they have been depoſited, and upon whoſe vitals they have preyed, till they came to maturity. There is no inſect whatever, which they will not attack, in order to leave their fatal preſent in its body; the caterpillar, the gnat, and even the ſpider himſelf, ſo formidable to others, is often made the unwilling foſterer of this deſtructive progeny.

About the middle of ſummer, when other inſects are found in great abundance, the ichneumon is ſeen flying buſily about, and ſeeking proper objects upon whom to depoſit its progeny. As there are various kinds of this fly, ſo they ſeem to have various appetites. Some are found to place their eggs within the aurelia of ſome naſcent inſect, others place them within the neſt, which the waſp had curiouſly contrived for its own young; and as both are produced at the ſame time, the young of the ichneumon not only devours the young waſp, but the whole ſupply of worms, which the parent had carefully provided for its proviſion. But the greateſt number of the ichneumon tribe are ſeen ſettling upon the back of the caterpillar, and darting, at different intervals, their ſtings into its body. It often happens, that the caterpillar ſurvives the worm ſtate of the infant ichneumons, and then they change into a cryſalis, encloſed in its body till the time of their delivery approaches, when they burſt their priſons, and fly away. The caterpillar, however, is irreparably deſtroyed, it never changes into a cryſalis, but dies ſhortly after, from the injuries it had ſuſtained.

THE ANT.] Though the number of two-winged flies be very great, and the naturaliſts have taken ſome pains to deſcribe their characters and varieties; yet there is ſuch a ſimilitude in their forms and manners, that in a work like this, one deſcription muſt ſerve for all. We now, therefore, come to a ſpecies of four-winged inſects, that are famous from all antiquity, for their ſocial and induſtrious habits, that are marked for their ſpirit of ſubordination, that are offered as a pattern of parſimony to the profuſe, and of unremitting diligence to the ſluggard.

In the experiments, however, which have been more recently made, and the obſervations which have been taken, much of their boaſted frugality and precaution ſeems denied them: the treaſures they lay up, are no longer ſuppoſed intended for future proviſion; and the choice they make in their ſtores, ſeems no way dictated by wiſdom. It is, indeed, ſomewhat ſurpriſing, that almoſt every writer of antiquity, ſhould deſcribe this inſect, as labouring in the ſummer, and feaſting upon the produce during the winter. Perhaps, in ſome of the warmer climates, where the winter is mild, and of ſhort continuance, this may take place; but in France and England theſe animals can have no manner of occaſion for a ſupply of winter proviſions, as they are actually in a ſtate of torpidity during that ſeaſon.

The common ants of Europe are of two or three different kinds; ſome *red*, ſome *black*, ſome with ſtings, and others without. Such as have ſtings, inflict their wounds in that manner; ſuch as are unprovided with theſe weapons of defence, have a power of ſpurting, from their hinder parts, an acid pungent liquor, which, if it lights upon the ſkin, inflames and burns it like nettles.

The body of an ant is divided into the head, breaſt, and belly. In the head, the eyes are placed, which are entirely black, and under the eyes there are two ſmall horns or feelers, compoſed of twelve joints, all covered with a fine ſilky hair. The mouth is furniſhed with two crooked jaws, which project outwards, in each of which are ſeen inciſors, that look like teeth. The breaſt is covered with a fine ſilky hair, from which project ſix legs, that are pretty ſtrong and hairy, the extremities of each armed with two ſmall claws, which the animal uſes in climbing. The belly is more reddiſh than the reſt of the body, which is of a brown cheſnut colour, ſhining as glaſs, and covered with extremely fine hair.

From ſuch a formation, this animal ſeems bolder, and more active, for its ſize, than any other of the inſect tribe, and fears not to attack a creature, often above ten times its own magnitude.

As ſoon as the winter is paſt, in the firſt fine day in April, the ant hill, that before ſeemed a deſert, now ſwarms with new life, and myriads of theſe inſects are ſeen juſt awaked from their annual lethargy, and preparing for the pleaſures and fatigues of the ſeaſon. For the firſt day they never offer to leave the hill, which may be conſidered as their citadel, but run over every part of it, as if to examine its preſent ſituation, to obſerve what injuries it has ſuſtained during the rigours of winter, * while they ſlept, and to meditate and ſettle the labours of the day enſuing.

At the firſt diſplay of their forces, none but the wingleſs tribe appears, while thoſe furniſhed with wings remain at the bottom. Theſe are the working ants, that firſt appear, and that are always deſtitute of wings; the males and females, that are furniſhed with four large wings each, are more ſlow in making their appearance.

Thus, like bees, they are divided into males, females, and the neutral or the working tribe. Theſe are all eaſily diſtinguiſhed from each other; the females are much larger than the males; the working ants are the ſmalleſt of all.

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* Memoires pour ſervir à l' Hiſtoire des Inſectes par Charles de Geer.

The two former have wings; which, however, they ſometimes are diveſted of; the latter never have any, and upon them are devolved all the labours that tend to the welfare of the community. The female, alſo, may be diſtinguiſhed by the colour and ſtructure of her breaſt, which is a little more brown than that of the common ant, and a little brighter than that of the male.

In the fields of England, ant-hills are formed with but little apparent regularity. In the more ſouthern provinces of Europe, they are conſtructed with wonderful contrivance, and offer a ſight highly worthy a naturaliſt's curioſity. Theſe are generally formed in the neighbourhood of ſome large tree and a ſtream of water. The one is conſidered by the animals, as the proper place for getting food; the other for ſupplying them with moiſture, which they cannot well diſpenſe with. The ſhape of the ant-hill is that of a ſugar-loaf, about three feet high, compoſed of various ſubſtances; leaves, bits of wood, ſand, earth, bits of gum, and grains of corn. Theſe are all united into a compact body, perforated with galleries down to the bottom, and winding ways within the body of the ſtructure. From this retreat to the water, as well as to the tree, in different directions, there are many paths worn by conſtant aſſiduity, and along theſe the buſy inſects are ſeen paſſing and repaſſing continually; ſo that from May, or the beginning of June, according to the ſtate of the ſeaſon, they work continually, till the cold weather comes on.

The chief employment of the working ants, is in ſuſtaining not only the idlers at home, but alſo finding a ſufficiency of food for themſelves. They live upon various proviſions, as well of the vegetable as of the animal kind. Small inſects they will kill and devour; ſweets of all kinds they are particularly fond of. They ſeldom, however, think of their community, till they themſelves are firſt ſatiated. Having found a juicy fruit, they ſwallow what they can, and then tearing it in pieces, carry home their load. If they meet with an inſect above their match, ſeveral of them will fall upon it at once, and having mangled it, each will carry off a part of the ſpoil. If they meet, in their excurſions, any thing that is too heavy for one to bear, and yet, which they are unable to divide, ſeveral of them will endeavour to force it along; ſome dragging and others puſhing. If any one of them happens to make a lucky diſcovery, it will immediately give advice to others; and then at once, the whole republic will put themſelves in motion. If in theſe ſtruggles, one of them happens to be killed, ſome kind ſurvivor will carry him off to a great diſtance, to prevent the obſtructions his body may give to the general ſpirit of induſtry.

But while they are thus employed in ſupporting the ſtate, in feeding abroad, and carrying in proviſions to thoſe that continue at home, they are not unmindful of poſterity. After a few days of fine weather, the female ants begin to lay their eggs, and thoſe are as aſſiduouſly watched and protected by the working ants, who take upon themſelves to ſupply whatever is wanting to the naſcent animal's convenience or neceſſity. They are carried, as ſoon as laid, to the ſafeſt ſituation, at the bottom of their hill, where they are carefully defended from cold and moiſture. We are not to ſuppoſe, that thoſe white ſubſtances which we ſo plentifully find in every ant-hill, are the eggs as newly laid. On the contrary, the ant's egg is ſo very ſmall, that, though laid upon a black ground, it can ſcarcely be diſcerned. The little white bodies we ſee, are the young animals in their maggot ſtate, endued with life, long ſince freed from the egg, and often involved in a cone, which it has ſpun round itſelf, like the ſilkworm. The real egg, when laid, if viewed through a microſcope, appears ſmooth, poliſhed and ſhining, while the maggot is ſeen compoſed of twelve rings, and is often larger than the ant itſelf.

It is impoſſible to expreſs the fond attachment which the working ants ſhew to their riſing progeny. In cold weather they take them in their mouths, but without offering them the ſmalleſt injury, to the very depths of their habitation, where they are leſs ſubject to the ſeverity of the ſeaſon. In a fine day they remove them, with the ſame care, nearer the ſurface, where their maturity may be aſſiſted by the warm beams of the ſun. If a formidable enemy ſhould come to batter down their whole habitation, and cruſh them by thouſands in the ruin, yet theſe wonderful inſects, ſtill mindful of their parental duties, make it their firſt care to ſave their offſpring. They are ſeen running wildly about, and different ways, each loaded with a young one, often bigger than the inſect that ſupports it. I have kept, ſays Swammerdam, ſeveral of the working ants in my cloſet, with their young, in a glaſs filled with earth. I took pleaſure in obſerving, that in proportion as the earth dried on the ſurface, they dug deeper and deeper to depoſit their eggs; and when I poured water thereon, it was ſurpriſing to ſee with what care, affection, and diligence they laboured, to put their brood in ſafety, in the drieſt place. I have ſeen alſo, that when water has been wanting for ſeveral days, and when the earth was moiſtened after it a little, they immediately carried their young ones to have a ſhare, who ſeemed to enjoy and ſuck the moiſture.

When the young maggot is come to its full growth, the breaſt ſwells inſenſibly, it caſts its ſkin, and loſes all motion. All the members which were hidden before, then begin to appear, an aurelia is formed, which repreſents very diſtinctly, all the parts of the animal, though they are yet without motion, and, as it were, wrapped up in ſwaddling clothes. When at length the little inſect has paſſed through all its changes, and acquired its proper maturity, it burſts this laſt ſkin, to aſſume the form it is to retain ever after. Yet this is not done by the efforts of the little animal alone, for the old ones very aſſiduouſly break open, with their teeth, the covering in which it is encloſed. Without this aſſiſtance, the aurelia would never be able to get free, as Mr. De Geer often found, who tried the experiment, by leaving the aurelia to themſelves. The old ones not only aſſiſt them, but know the very preciſe time for lending their aſſiſtance; for, if produced too ſoon, the young one dies of cold; if retarded too long, it is ſuffocated in its priſon.

When the female has done laying, and the whole brood is thus produced, her labours, as well as that of the male, become unneceſſary; and her wings, which ſhe had but a ſhort time before ſo actively employed, drop off. What becomes of her when thus diveſted of her ornaments is not well known, for ſhe is ſeen in the cells for ſome weeks after. The males, on the other hand, having no longer any occupation at home, make uſe of thoſe wings with which they have been furniſhed by nature, and fly away, never to return, or to be heard of more. It is probable they periſh with the cold, or are devoured by the birds, which are particularly fond of this petty prey.

In the mean time, the working ants having probably depoſed their queens, and being deſerted by the males, that ſerved but to clog the community, prepare for the ſeverity of the winter, and bury their retreats as deep in the earth as they conveniently can. It is now found, that the grains of corn, and other ſubſtances with which they furniſh their hill, are only meant as fences to keep off the rigours of the weather, not as proviſions to ſupport them during its continuance. It is found generally to obtain, that every inſect that lives a year after it is come to its full growth, is obliged to paſs four or five months without taking any nouriſhment, and will ſeem to be dead all that time. It would be to no purpoſe, therefore, for ants to lay up corn for the winter, ſince they lie that time without motion, heaped upon each other, and are ſo far from eating, that they are utterly unable to ſtir. Thus, what authors have dignified by the name of a magazine, appears to be no more than a cavity, which ſerves for a common retreat when the weather forces them to return to their lethargic ſtate.

What has been ſaid with exaggeration of the European ant, is however true, if aſſerted of thoſe of the tropical climates. They build an ant-hill with great contrivance and regularity, they lay up proviſions, and, as they probably live the whole year, they ſubmit themſelves to regulations entirely unknown among the ants of Europe.

Thoſe of Africa are of three kinds, the *white*, the *green*, and the *black*; the latter are above an inch long, and in every reſpect a moſt formidable inſect. Their ſting produces extreme pain, and their depredations are ſometimes extremely deſtructive. They build an ant-hill of a very great ſize, from ſix to twelve feet high; it is made of viſcous clay, and tapers into a pyramidal form. This habitation is conſtructed with great artifice; and the cells are ſo numerous and even, that a honey-comb ſcarce exceeds them in number and regularly.

The inhabitants of this edifice ſeem to be under a very ſtrict regulation. At the ſlighteſt warning they will ſally out upon whatever diſturbs them; and if they have time to arreſt their enemy, he is ſure to find no mercy. Sheep, hens, and even rats are often deſtroyed by theſe mercileſs inſects, and their fleſh devoured to the bone. No anatomiſt in the world can ſtrip a ſkeleton ſo cleanly as they; and no animal, how ſtrong ſoever, when they have once ſeized upon it, has power to reſiſt them.

It often happens that theſe inſects quit their retreat in a body, and go in queſt of adventures.

"During my ſtay," ſays Smith, "at Cape Corſe Caſtle, "a body of theſe ants came to pay us a viſit in our fortification. It was about day-break when the advanced "guard of this famiſhed crew entered the chapel, where "ſome negroe ſervants were aſleep upon the floor. The "men were quickly alarmed at the invaſion of this unexpected army, and prepared, as well as they could, for a

" defence. While the foremoſt battalion of inſects had " already taken poſſeſſion of the place, the rear-guard was " more than a quarter of a mile diſtant. The whole ground " ſeemed alive, and crawling with unceaſing deſtruction. " After deliberating a few moments upon what was to be " done, it was reſolved to lay a large train of gunpowder " along the path they had taken: by this means millions " were blown to pieces, and the rear-guard perceiving the " deſtruction of their leaders, thought proper inſtantly to " return, and make back to their original habitation."

The order which theſe ants obſerve, ſeems very extraordinary; whenever they ſally forth, fifty or ſixty larger than the reſt are ſeen to head the band, and conduct them to their deſtined prey. If they have a fixed ſpot where their prey continues to reſort, they then form a vaulted gallery, which is ſometimes a quarter of a mile in length; and yet they will hollow it out in the ſpace of ten or twelve hours.

Of the BEETLE there are various kinds; (See pl. CV.) all, however, concurring in one common formation of having caſes to their wings, which are the more neceſſary to thoſe inſects, as they often live under the ſurface of the earth, in holes which they dig out by their own induſtry. Theſe caſes prevent the various injuries their real wings might ſuſtain, by rubbing or cruſhing againſt the ſides of their abode. Theſe, though they do not aſſiſt flight, yet keep the internal wings clean and even, and produce a loud buzzing noiſe, when the animal riſes in the air.

If we examine the formation of all animals of the beetle kind, we ſhall find, as in ſhell-fiſh, that their bones are placed externally, and their muſcles within. Theſe muſcles are formed very much like thoſe of quadrupedes, and are endued with ſuch ſurpriſing ſtrength, that bulk for bulk, they are a thouſand times ſtronger than thoſe of a man. The ſtrength of theſe muſcles is of uſe in digging the animal's ſubterraneous abode, where it is moſt uſually hatched, and to which it moſt frequently returns, even after it becomes a winged inſect, capable of flying.

Beſide the difference which reſults from the ſhape and colour of theſe animals, the ſize alſo makes a conſiderable one; ſome beetles being not larger than the head of a pin, while others, ſuch as the elephant beetle, are as big as one's fiſt: But the greateſt difference among them is, that ſome are produced in a month, and in a ſingle ſeaſon go through all the ſtages of their exiſtence, while others take near four years to their production; and live as winged inſects a year more. To give the hiſtory of all theſe animals, that are bred pretty much in the ſame way, would be inſipid and endleſs; it will ſuffice to ſelect one or two from the number, the origin of which may ſerve as ſpecimens of the reſt. We will, therefore, offer the hiſtory of the may-bug to the reader's attention; premiſing, that moſt other beetles, though not ſo long lived, are bred in the ſame manner.

The *may-bug*, or doree-beetle, as ſome call it, has, like all the reſt, a pair of caſes to its wings, which are of a reddiſh brown colour, ſprinkled with a whitiſh duſt, which eaſily comes off. In ſome years their necks are ſeen covered with a red plate, and in others with a black; theſe, however, are diſtinct ſorts, and their difference is by no means accidental. The fore-legs are very ſhort, and the better calculated for burrowing in the ground, where this inſect makes its retreat. It is well known for its evening buzz to children; but ſtill more formidably introduced to the acquaintance of huſbandmen and gardeners, for in ſome ſeaſons, it has been found to ſwarm in ſuch numbers, as to eat up every vegetable production.

The two ſexes in the may-bug, are eaſily diſtinguiſhed from each other, by the ſuperior length of the tufts, at the end of the horns, in the male.

In about three months after the eggs have been depoſited in the earth, the contained inſect begins to break its ſhell, and a ſmall grub or maggot crawls forth, and feeds upon the roots of whatever vegetable it happens to be neareſt. All ſubſtances, of this kind, ſeem equally grateful, yet it is probable the mother inſect has a choice among what kind of vegetables ſhe ſhall depoſit her young. In this manner, theſe voracious creatures continue in the worm ſtate, for more than three years, devouring the roots of every plant they approach, and making their way under ground, in queſt of food, with great diſpatch and facility. At length they grow to above the ſize of a walnut, being a great thick white maggot with a red head, which is ſeen moſt frequently in new turned earth, and which is ſo eagerly ſought after by birds of every ſpecies.

When largeſt, they are found an inch and an half long, of a whitiſh yellow colour, with a body conſiſting of twelve ſegments or joints, on each ſide of which there are nine breathing holes, and three red feet. The head is large, in proportion to the body, of a reddiſh colour, with a pincer before, and a ſemi-circular lip, with which it cuts the roots of plants, and ſucks out their moiſture. As this inſect lives entirely under ground, it has no occaſion for eyes, and accordingly it is found to have none; but is furniſhed with two feelers, which, like the crutch of a blind man, ſerve to direct its motions. Such is the form of this animal, that lives for years in the worm ſtate under ground, ſtill voracious, and every year changing its ſkin.

It is not till the end of the fourth year, that this extraordinary inſect prepares to emerge from its ſubterraneous abode, and even this is not effected, but by a tedious preparation.

About the latter end of autumn, the grub begins to perceive the approach of its transformation, it then buries itſelf deeper and deeper in the earth, ſometimes ſix feet beneath the ſurface, and there forms itſelf a capacious apartment, the walls of which it renders very ſmooth and ſhining, by the excretions of its body. Its abode being thus formed, it begins ſoon after to ſhorten itſelf, to ſwell, and to burſt its laſt ſkin, in order to aſſume the form of a chryſalis. This, in the beginning, appears of a yellowiſh colour, which heightens by degrees, till at laſt, it is ſeen nearly red. Its exterior form plainly diſcovers all the veſtiges of the future winged inſect, all the fore parts being diſtinctly ſeen; while behind, the animal ſeems as if wrapped in ſwaddling clothes.

The young may-bug continues in this ſtate for about three months longer, and it is not till the beginning of January, that the aurelia diveſts itſelf of all its impediments, and becomes a winged inſect, completely formed. Yet ſtill the animal is far from attaining its natural ſtrength, health, and appetite. It undergoes a kind of infant imbecility, and, unlike moſt other inſects, that the inſtant they become flies, are arrived at their ſtate of full perfection, the may-bug continues feeble and ſickly.

Its colour is much brighter than in the perfect animal, all parts are ſoft, and its voracious nature ſeems, for a while, to have entirely forſaken it.

About the latter end of May, theſe inſects, after having lived for four years under ground, burſt from the earth, when the firſt mild evening invites them abroad. They are at that time ſeen riſing from their long impriſonment, from living long only upon roots, and imbibing only the moiſture of the earth, to viſit the mildneſs of the ſummer air, to chooſe the ſweeteſt vegetables for their banquet, and to drink the dew of the evening.

Wherever an attentive obſerver then walks abroad, he will ſee them burſting up before him in his pathway, like ghoſts on a theatre. He will ſee every part of the earth, that had its ſurface beaten into hardneſs, perforated by their egreſſion. When the ſeaſon is favourable for them, they are ſeen by thouſands buzzing along, hitting againſt every object that intercepts their flight. The mid-day ſun, however, ſeems too powerful for their conſtitutions; they then lurk under the leaves and branches of ſome ſhady tree; but the willow ſeems particularly their moſt favourite food; there they lurk in cluſters, and ſeldom quit the tree till they have devoured all its verdure.

Their duration, however, is but ſhort, as they never ſurvive the ſeaſon.

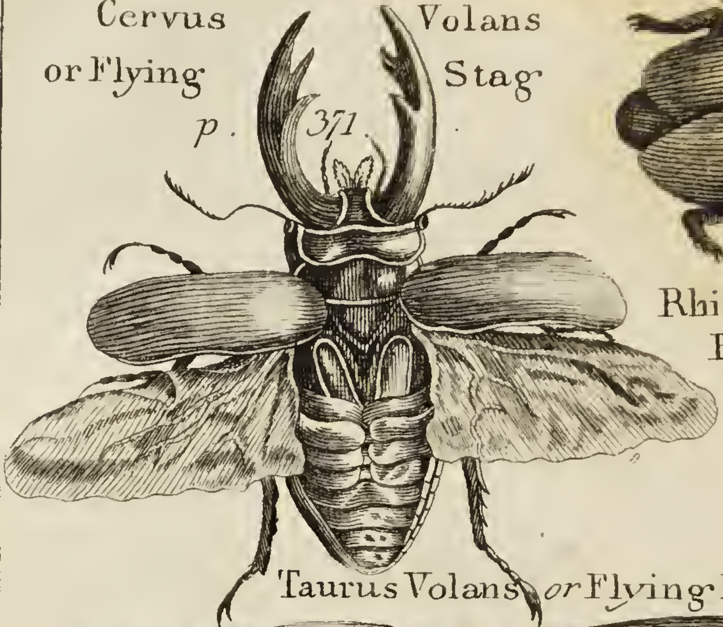
Of all the beetle kind, this is the moſt numerous, and therefore deſerves the chief attention of hiſtory. Like them, all other beetles are bred from the egg, which is depoſited in the ground, or ſometimes, though ſeldom, in the barks of trees; they change into a worm; they ſubſiſt in that ſtate by living upon the roots of vegetables, or the ſucculent parts of the bark round them.

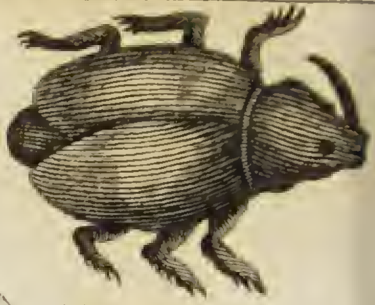
It would be endleſs to give a deſcription of all, and yet it would be an unpardonable omiſſion not to mention the particularities of ſome beetles, which are ſingular either from their ſize, their manners, or their formation.

That beetle which the Americans call the *tumble-dung*, particularly demands our attention; it is all over of a duſky black, rounder than thoſe animals are generally found to be, and ſo ſtrong, though not much larger than the common black beetle, that if one of them be put under a braſs candleſtick, it will cauſe it to move backwards and forwards, as if it were by an inviſible hand, to the admiration of thoſe who are not accuſtomed to the ſight; but this ſtrength is given it for much more uſeful purpoſes than thoſe of exciting human curioſity, for there is no creature more laborious, either in ſeeking ſubſiſtence, or in providing a proper retreat for its young. They are endowed with ſagacity to diſcover ſubſiſtence by their excellent ſmelling, which directs them in flights to excrements juſt fallen from man or beaſt, on

Beetles

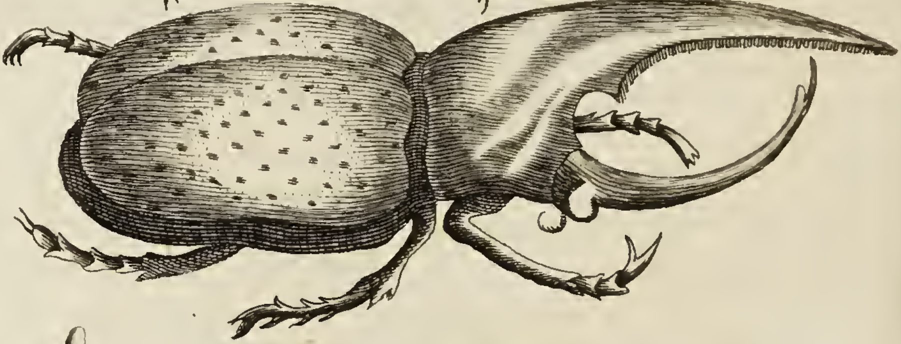
Cervus Volans or Flying Stag p. 371.



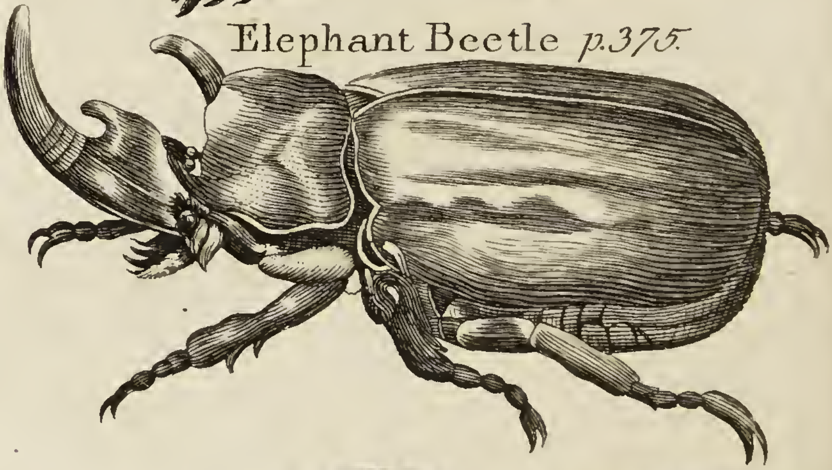


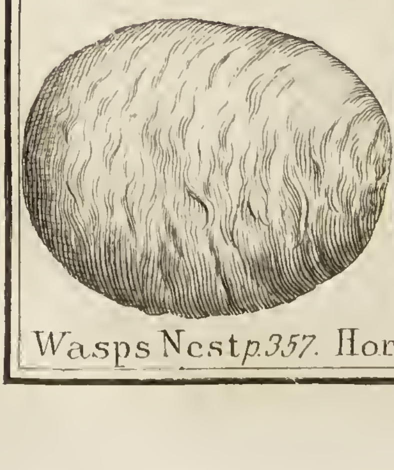
Rhinoceros Beetle p.375.

Taurus Volans or Flying Bull p.371.



Elephant Beetle p.375.





Wasps Nest p.357.

Hornets Nest p.361.

Wasps Nest p.359.

which they inſtantly drop, and fall unanimouſly to work in forming round balls or pellets thereof, in the middle of which they lay an egg. Theſe pellets, in September, they convey three feet deep in the earth, where they lie till the approach of ſpring, when the eggs are hatched, the neſts burſt, and the inſects find their way out of the earth. They aſſiſt each other with indefatigable induſtry, in rolling theſe globular pellets to the place where they are to be buried. This they are to perform with the tail foremoſt, by raiſing up their hinder part, and ſhoving along the ball with their hind feet. They are always accompanied with other beetles of a larger ſize, and of a more elegant ſtructure and colour. The breaſt of this is covered with a ſhield of a crimſon colour, and ſhining like metal; the head is of the like colour, mixed with green, and on the crown of the head ſtands a ſhining black horn, bended backwards. Theſe are called the *kings of the beetles*, but for what reaſon is uncertain, ſince they partake of the ſame dirty drudgery with the reſt.

The *elephant-beetle* (See pl. CV.) is the largeſt of this kind hitherto known, and is found in South America, particularly Guiana and Surinam, as well as about the river Oroonoko. It is of a black colour, and the whole body is covered with a very hard ſhell, full as thick and as ſtrong as that of a ſmall crab. Its length, from the hinder part of the eyes, is almoſt four inches, and from the ſame part to the end of the proboſcis, or trunk, four inches and three quarters. The tranſverſe diameter of the body is two inches and a quarter, and the breadth of each elytron, or caſe for the wings, is an inch and three tenths. The antennæ, or feelers, are quite horny; for which reaſon the proboſcis, or trunk, is moveable at its inſertion into the head, and ſeems to ſupply the place of feelers. The horns are eight tenths of an inch long, and terminate in points. The proboſcis is an inch and a quarter long, and turns upwards, making a crooked line, terminating in two horns, each of which is near a quarter of an inch long; but they are not perforated at the end like the proboſcis of other inſects. About four tenths of an inch above the head, or that ſide next the body, is a prominence, or ſmall horn, which, if the reſt of the trunk were away, would cauſe this part to reſemble the horn of a rhinoceros. There is indeed a beetle ſo called, but then the horns or trunk has no fork at the end, though the lower horn reſembles this. The feet are all forked at the end, but not like lobſter's claws.

To this claſs we may alſo refer the *glow-worm*, that little animal which makes ſuch a diſtinguiſhed figure in the deſcriptions of our poets. No two inſects can differ more than the male and female of this ſpecies from each other. The male is in every reſpect a beetle, having caſes to its wings, and riſing in the air at pleaſure; the female, on the contrary, has none, but is entirely a creeping inſect, and is obliged to wait the approaches of her capricious companion. The body of the female has eleven joints, with a ſhield breaſt plate, the ſhape of which is oval; the head is placed over this, and is very ſmall, and the three laſt joints of her body are of a yellowiſh colour; but what diſtinguiſhes it from all other animals, at leaſt in this part of the world, is the ſhining light which it emits by night, and which is ſuppoſed by ſome philoſophers to be an emanation which ſhe ſends forth to allure the male to her company.

Moſt travellers, who have gone through ſandy countries, muſt well remember the little ſhining ſparks with which the ditches are ſtudded on each ſide of the road. If incited by curioſity to approach more nearly, he will find the light ſent forth by the glow-worm; if he ſhould keep the little animal for ſome time, its light continues to grow paler, and at laſt appears totally extinct.

The *cantharis* is of the beetle kind, whence come cantharides, well known in the ſhops by the name of Spaniſh flies, and for their uſe in bliſters. They have feelers like briſtles, flexible caſes to the wings, a breaſt pretty plain, and the ſides of the belly wrinkled. Cantharides differ from each other in their ſize, ſhape, and colour, thoſe uſed in the ſhops alſo do the ſame. The largeſt in theſe parts are about an inch long, and as much in circumference, but others are not above three quarters of an inch. Some are of a pure azure colour, others of pure gold, and others again, have a mixture of pure gold and azure colours: but they are all very brilliant, and extremely beautiful. Theſe inſects, as is well known, are of the greateſt benefit to mankind, making a part in many medicines conducive to human preſervation. They are chiefly natives of Spain, Italy, and Portugal; but they are to be met with alſo about Paris in the ſummer time, upon the leaves of the aſh, the poplar, and the roſe-trees, and alſo among wheat, and in meadows.

We are told, that the country people expect the return of theſe inſects every ſeven years. It is very certain, that ſuch a number of them have been ſeen together in the air, that they appeared like ſwarms of bees; and that they have ſo diſagreeable a ſmell, that it may be perceived a great way off, eſpecially about ſun-ſet, though they are not ſeen at that time. This bad ſmell is a guide for thoſe who make it their buſineſs to catch them. When they are caught they dry them, after which they are ſo light, that fifty will hardly weigh a dram. Thoſe that gather them, tie them in a bag, or a piece of linen cloth, that has been well worn, and then they kill them with the vapours of hot vinegar, after which, they dry them in the ſun, and keep them in boxes.

An inſect of great, though perhaps not equal uſe in medicine, is that which is known by the name of the *kermes*; it is produced in the excreſcence of an oak, called the berry-bearing ilex, and appears at firſt wrapt up in a membranaceous bladder, of the ſize of a pea, ſmooth and ſhining, of a browniſh red colour, and covered with a very fine aſh-coloured powder. This bag teems with a number of reddiſh eggs or inſects, which being rubbed with the fingers, pour out a crimſon liquor. It is only met with in warm countries in the months of May and June.

In the month of April this inſect becomes of the ſize and ſhape of a pea, and its eggs ſome time after burſt from the womb, and ſoon turning worms, run about the branches and leaves of the tree. They are of two ſexes, and the females have been hitherto deſcribed; but the males are very diſtinct from the former, and are a ſort of ſmall flies like gnats, with ſix feet, of which the four forward are ſhort, and the two backward long, divided into four joints, and armed with three crooked nails. There are two feelers on the head, a line and a half long, which are moveable, ſtreaked, and articulated. The tail, at the back part of the body, is half a line long, and forked. The whole body is covered with two tranſparent wings, and they leap about in the manner of fleas.

The harveſt of the kermes is greater or leſs in proportion to the ſeverity of the winter, and the women gather them before ſun-riſing, tearing them off with their nails, for fear there ſhould be any loſs from the hatching of the inſects. They ſprinkle them with vinegar, and lay them in the ſun to dry, where they acquire a red colour.

An inſect, perhaps, ſtill more uſeful than either of the former, is the *cochineal*.

This inſect is of an oval form, of the ſize of a ſmall pea, with ſix feet, and a ſnout or trunk. It brings forth its young alive, and is nouriſhed by ſucking the juice of the plant. Its body conſiſts of ſeveral rings; and when it is once fixed on the plant, it continues immoveable, being ſubject to no change. Some pretend there are two ſorts, the one domeſtic, which is beſt, and the other wild, that is of a vivid colour; however, they appear to be the ſame, only with this difference, that the wild feeds upon uncultivated trees, without any aſſiſtance, whereas the domeſtic is carefully at a ſtated ſeaſon, removed to cultivated trees, where it feeds upon a purer juice. Thoſe who take care of theſe inſects, place them on the prickly pear-plant in a certain order, and are very induſtrious in defending them from other inſects; for if any other kind come among them, they take care to bruſh them off with foxes tails. Towards the end of the year, when the rains and cold weather are coming on, which are fatal to theſe inſects, they take off the leaves or branches covered with cochineal, that have not attained their utmoſt degree of perfection, and keep them in their houſes till winter is paſt. Theſe leaves are very thick and juicy, and ſupply them with ſufficient nouriſhment, while they remain within doors. When the milder weather returns, and theſe animals are about to exclude their young, the natives make them neſts, like thoſe of birds, but leſs, of tree-moſs, or ſoft hay, or the down of cocoa-nuts, placing twelve in every neſt. Theſe they fix on the thorns of the prickly pear-plant, and in three or four days time they bring forth their young, which leave their neſts in a few days, and creep upon the branches of the plant, till they find a proper place to reſt in.

When the native Americans have gathered the cochineal, they put them into holes in the ground, where they kill them with boiling water, and afterwards dry them in the ſun, or in an oven, or lay them upon hot plates. From the various methods of killing them, ariſe the different colours which they appear in when brought to us. While they are living, they ſeem to be ſprinkled over with a white powder, which they loſe as ſoon as the boiling water is poured upon them. Thoſe that are dried upon hot plates are the blackeſt. What we call the cochineal, are only the females, for the males are a ſort of fly, as already obſerved, in the kermes. They are uſed both for dyeing and medicine, and are ſaid to have much the ſame virtue as the kermes, though they are now ſeldom uſed alone, but are mixed with other things for the ſake of the colour.

We ſhall end this account of the beetle tribe, with the hiſtory of an animal which cannot properly be ranked under this ſpecies, and yet which cannot be more methodically ranged under any other. This is the inſect that forms and reſides in the gall nut, the ſpoils of which are converted to ſuch uſeful purpoſes.

The *gall inſects* are bred in a ſort of bodies adhering to a kind of oak in Aſia, which differ with regard to their colour, ſize, roughneſs, ſmoothneſs, and ſhape, and which we call galls. They are not fruit as ſome have imagined, but preternatural tumours, owing to the wounds given to the buds, leaves, and twigs of the tree, by a kind of inſects that lay their eggs within them. This animal is furniſhed with an implement, by which the female penetrates into the bark of the tree, or into that ſpot which juſt begins to bud, and there ſheds a drop of corroſive fluid into the cavity. Having thus formed a receptacle for her eggs, ſhe depoſits them in the place, and dies ſoon after.

The juice or ſap of the plant thus turned back from its natural courſe, extravaſates and flows round the egg; after which it ſwells and dilates by the aſſiſtance of ſome bubbles of air, which get admiſſion through the pores of the bark, and which run in the veſſels with the ſap.

This little ball receives its nutriment, growth, and vegetation, as the other parts of the tree, by ſlow degrees, and is what we call the gall-nut. The worm that is hatched under this ſpacious vault, finds in the ſubſtance of the ball, which is as yet very tender, a ſubſiſtence ſuitable to its nature; gnaws and digeſts it till the time comes for its tranſformation to a nymph or cryſalis, and from that ſtate of exiſtence changes into a fly. After this the inſect, perceiving itſelf duly provided with all things requiſite, diſengages itſelf ſoon from its confinement, and takes its flight into the open air. The caſe, however, is not ſimilar with reſpect to the gall-nut that grows in autumn. The cold weather frequently comes on before the worm is transformed into a fly, or before the fly can pierce through its incloſure. The nut falls with the leaves, and although you may imagine that the fly which lies within is loſt, yet in reality it is not ſo; on the contrary, its being covered up ſo cloſe, is the means of its preſervation. Thus it ſpends the winter in a warm houſe, where every crack and cranny of the nut is well ſtopped up; and lies buried as it were under a heap of leaves, which preſerves it from the injuries of the weather. This apartment, however, though ſo commodious a retreat in the winter, is a perfect priſon in the ſpring. The fly, rouzed out of its lethargy by the firſt heats, breaks its way through, and ranges where it pleaſes. A very ſmall aperture is ſufficient, ſince at this time the fly is but a diminutive creature. Beſides, the ringlets whereof its body is compoſed, dilate, and become pliant in the paſſage.

Of the GNAT and the TIPULA.] There are two inſects which entirely reſemble each other in their form, and yet widely differ in their habits, manners, and propagation. Thoſe who have ſeen the tipula, or long-legs, and the larger kind of gnat, have moſt probably miſtaken the one for the other; they have often accuſed the tipula, a harmleſs inſect, of depredations made by the gnat, and the innocent have ſuffered for the guilty.

The chief and only difference between them is, that the tipula wants a trunk, while the gnat has a large one, which it often exerts to very miſchievous purpoſes.

The gnat proceeds from a little worm, which is uſually ſeen at the bottom of ſtanding waters. The manner in which the inſect lays its eggs is particularly curious; after having laid the proper number on the ſurface of the water, it ſurrounds them with a kind of unctuous matter, which prevents them from ſinking; but at the ſame time faſtens them with a thread to the bottom, to prevent their floating away, at the mercy of every breeze, from a place the warmth of which is proper for their production, to any other, where the water may be too cold, or the animals its enemies too numerous. Thus the inſects, in their egg ſtate, reſemble a buoy, which is fixed by an anchor. As they come to maturity, they ſink deeper, and at laſt, when they leave the eggs as worms, they creep at the bottom. They now make themſelves lodgments of cement, which they faſten to ſome ſolid body at the very bottom of the water, unleſs, by accident, they meet with a piece of chalk, which being of a ſoft and pliant nature, gives them an opportunity of ſinking a retreat for themſelves, where nothing but the claws of a cray-fiſh can poſſibly moleſt them. The worm afterwards changes its form. It appears with a large head, and a tail inveſted with hair, and moiſtened with an oleaginous liquor, which ſhe makes uſe of as a cork, to ſuſtain her head in the air, and her tail in the water, and to tranſport her from one place to another. When the oil with which her tail is moiſtened begins to grow dry, ſhe diſcharges out of her mouth an unctuous humour, which ſhe ſheds all over her tail, by virtue whereof, ſhe is enabled to tranſport herſelf where ſhe pleaſes, without being either wet or any ways incommoded by the water.

The gnat, in her ſecond ſtate, is, properly ſpeaking, in her form of a nymph, which is an introduction, or entrance into a new life. In the firſt place, ſhe diveſts herſelf of her ſecond ſkin; in the next ſhe reſigns her eyes, her antennæ, and her tail; in ſhort, ſhe actually ſeems to expire. However, from the ſpoils of the amphibious animal, a little winged inſect cuts the air, whoſe every part is active to the laſt degree, and whoſe whole ſtructure is the juſt object of our admiration. Its little head is adorned with a plume of feathers, and its whole body inveſted with ſcales and hair, to ſecure it from any wet or duſt. She makes trial of the activity of her wings, by rubbing them either againſt her body, or her broad ſide-bags, which keep her in an equilibrium. The furbelow, or little border of fine feathers, which graces her wings, is very curious, and ſtrikes the eye in the moſt agreeable manner. There is nothing, however, of greater importance to the gnat, than her trunk, and that weak implement may juſtly be deemed one of nature's maſter-pieces. It is ſo very ſmall, that the extremity of it can ſcarcely be diſcerned through the beſt microſcope that can be procured. That part which is at firſt obvious to the eye, is nothing but a long ſcaly ſheath under the throat. At near the diſtance of two-thirds of it, there is an aperture, through which the inſect darts out four ſtings, and afterwards retracts them. One of which, however ſharp and active it may be, is no more than the caſe in which the other three lie concealed, and run in a long groove. The ſides of theſe ſtings are ſharpened like two-edged ſwords; they are likewiſe barbed, and have a vaſt number of cutting teeth towards the point, which turns up like a hook, and is fine beyond expreſſion. When all theſe darts are ſtuck into the fleſh of animals, ſometimes one after another, and ſometimes all at once, the blood and humours of the adjacent parts muſt unavoidably be extravaſated; upon which a tumour muſt conſequently enſue, the little orifice whereof is cloſed up by the compreſſion of the external air. When the gnat, by the point of her caſe, which ſhe makes uſe of as a tongue, has taſted any fruit, fleſh, or juice, that ſhe has found out; if it be a fluid, ſhe ſucks it up, without playing her darts into it; but in caſe ſhe finds the leaſt obſtruction by any fleſh whatever, ſhe exerts her ſtrength, and pierces through it if poſſibly ſhe can. After this ſhe draws back her ſtings into their ſheath, which ſhe applies to the wound in order to extract, as through a reed, the juices which ſhe finds incloſed. This is the implement with which the gnat performs her work in the ſummer, for, during the winter, ſhe has no manner of occaſion for it. Then ſhe ceaſes to eat, and ſpends all that tedious ſeaſon either in quarries or in caverns, which ſhe abandons at the return of ſummer, and flies about in ſearch after ſome commodious ford, or ſtanding water, where ſhe may produce her progeny, which would be ſoon waſhed away and loſt, by the too rapid motion of any running ſtream. The little brood are ſometimes ſo numerous, that the very water is tinged according to the colour of the ſpecies, as green, if they be green, and of a ſanguine hue, if they be red.

Theſe are circumſtances ſufficiently extraordinary in the life of this little animal, but it offers ſomething ſtill more curious in the method of its propagation.

However ſimilar inſects of the gnat kind are in their appearance, yet they differ widely from each other in the manner in which they are brought forth, for ſome are produced from eggs, ſome are viviparous, and come forth in their moſt perfect form.

A gnat ſeparated from the reſt of its kind, and incloſed in a glaſs veſſel, with air ſufficient to keep it alive, ſhall produce young, which, alſo, when ſeparated from each other, ſhall be the parents of a numerous progeny. Thus, down for five or ſix generations, do theſe extraordinary animals propagate, without any congreſs between the male and female, but in the manner of vegetables, the young burſting from the body of their parents, without any previous impregnation. At the ſixth generation, however, their propagation ſtops, the gnat no longer produces its like, from itſelf alone, but it requires the acceſs of the male to give it another ſucceſſion of fecundity.

The gnat of Europe gives but little uneaſineſs; it is ſometimes heard to hum about our beds at night, and keeps off the approaches of ſleep by the apprehenſion it cauſes; but it is very different in the ill-peopled regions of America, where the waters ſtagnate, and the climate is warm, and where they are produced in multitudes beyond expreſſion.

ſion. The whole air is there filled with clouds of thoſe famiſhed inſects; and they are found of all ſizes, from ſix inches long, to a minuteneſs that even requires the microſcope to have a diſtinct perception of them. The warmth of the mid-day ſun is too powerful for their conſtitutions; but when the evening approaches, neither art nor flight can ſhield the wretched inhabitants from their attacks; though millions are deſtroyed, ſtill millions more ſucceed, and produce unceaſing torment.

The native Indians, who anoint their bodies with oil, and who have from their infancy been uſed to their depredations, find them much leſs inconvenient than thoſe who are newly arrived from Europe; they ſleep in their cottages covered all over with thouſands of the gnat kind upon their bodies, and yet do not ſeem to have their ſlumbers interrupted by their cruel devourers. If a candle happens to be lighted in one of thoſe places, a cloud of inſects at once light upon the flame, and extinguiſh it; they are therefore obliged to keep their candles in glaſs lanthorns; a miſerable expedient to prevent an unceaſing calamity!

CHAP. XXXIX.

Of Zoophytes in general—WORMS—*The Earth Worm*—*The Sea Worm*—*The White Water Worm*—*The* STAR FISH—*The Cuttle Fiſh*—*The* POLYPUS—LITHOPHYTES—*Different Species of Corals*—*Corallines*—*Sponges, &c.*

OF ZOOPHYTES.] WE are now come to the laſt link in the chain of animated nature, to a claſs of beings ſo confined in their powers, and ſo defective in their formation, that ſome hiſtorians have been at a loſs whether to conſider them as a ſuperior rank of vegetables, or the humbleſt order of the animated tribe.

In the claſs of zoophytes, we may place all thoſe animals, which may be propagated by cuttings, or, in other words, which, if divided into two or more parts, each part in time becomes a ſeparate and perfect animal; the head ſhoots forth a tail, and, on the contrary, the tail produces a head; ſome of theſe will bear dividing but into two parts, ſuch is the earth worm; ſome may be divided into more than two, and of this kind are many of the ſtar-fiſh; others ſtill may be cut into a thouſand parts, each becoming a perfect animal; they may be turned inſide out, like the finger of a glove, they may be moulded into all manner of ſhapes, yet ſtill their vital principle remains, ſtill every ſingle part becomes perfect in its kind, and, after a few days exiſtence, exhibits all the arts and induſtry of its parent! We ſhall, therefore, divide zoophytes according to their ſeveral degrees of perfection, namely, into worms, ſtar-fiſh, and polypi; contenting ourſelves with a ſhort review of thoſe creatures, that excite our curioſity chiefly by their imperfections.

The firſt in the claſs of zoophytes, are animals of the WORM kind, which, being entirely deſtitute of feet, trail themſelves along upon the ground, and find themſelves a retreat under the earth, or in the water. As theſe, like ſerpents, have a creeping motion, ſo both, in general, go under the common appellation of reptiles; a loathſome, noxious, malignant tribe, to which man, by nature, has the ſtrongeſt antipathy. But though worms, as well as ſerpents, are moſtly without feet, and have been doomed to creep along the earth on their bellies, yet their motions are very different. The ſerpent, as has been ſaid before, having a back bone, which it is incapable of contracting, bends its body into the form of a bow, and then ſhoots forward from the tail; but it is very different with the worm, which has a power of contracting or lengthening itſelf at will. There is a ſpiral muſcle, that runs round its whole body, from the head to the tail, ſomewhat reſembling a wire wound round a walking-cane, which, when ſlipped off, and one end extended and held faſt, will bring the other nearer to it; in this manner the earth-worm, having ſhot out, or extended of its body, takes hold by the ſlime of the fore part of its body, and ſo contracts and brings forward the hinder part; in this manner it moves onward, not without great effort; but the occaſions for its pregreſſive motion are few.

As it is deſigned for living under the earth, and leading a life of obſcurity, ſo it ſeems tolerably adapted to its ſituation. Its body is armed with ſmall ſtiff ſharp burrs or prickles, which it can erect or depreſs at pleaſure; under the ſkin there lies a ſlimy juice, to be ejected as occaſion requires, at certain perforations, between the rings of the muſcles, to lubricate its body, and facilitate its paſſage into the earth. Like moſt other inſects, it has breathing holes along the back, adjoining each ring; but it is without bones, without eyes, without ears, and, properly without feet. It has a mouth, and alſo an alimentary canal, which runs along to the very point of the tail. In ſome worms, however, particularly ſuch as are found in the bodies of animals, this canal opens towards the middle of the belly, at ſome diſtance from the tail. The inteſtines of the earth-worm are always found filled with a very fine earth, which ſeems to be the only nouriſhment theſe animals are capable of receiving.

The animal is entirely without brain, but near the head is placed the heart, which is ſeen to beat with a very diſtinct motion, and round it are the ſpermatic veſſels, forming a number of little globules, containing a milky fluid, which have an opening into the belly, not far from the head: they are alſo often found to contain a number of eggs, which are laid in the earth, and are hatched in twelve or fourteen days into life, by the genial warmth of their ſituation.

When the eggs are laid in the earth, which, in about fourteen days, as has been ſaid, are hatched into maturity, the young ones come forth very ſmall, but perfectly formed, and ſuffer no change during their exiſtence: how long their life continues is not well known, but it certainly holds for more than two or three ſeaſons. During the winter, they bury themſelves deeper in the earth, and ſeem, in ſome meaſure, to ſhare the general torpidity of the inſect tribe. In ſpring, they revive with the reſt of nature, and on thoſe occaſions, a moiſt or dewy evening brings them forth from their retreats, for the univerſal purpoſe of continuing their kind. They chiefly live in a light, rich, and fertile ſoil, moiſtened by dews or accidental ſhowers, but avoid thoſe places where the water is apt to lie on the ſurface of the earth, or where the clay is too ſtiff for their eaſy progreſſion under ground.

Helpleſs as they are formed, yet they ſeem very vigilant in avoiding thoſe animals that chiefly make them their prey; in particular, the mole, who feeds entirely upon them beneath the ſurface, and who ſeldom ventures, from the dimneſs of its ſight, into the open air; him they

avoid,

avoid, by darting up from the earth, the inſtant they feel the ground move; and fiſhermen, who are well acquainted with this, take them in what numbers they chooſe, by ſtirring the earth where they expect to find them. They are alſo driven from their retreats under ground, by pouring bitter or acrid water thereon, ſuch as that water in which green walnuts have been ſteeped, or a lye made of pot-aſhes.

Such is the general outline of the hiſtory of theſe reptiles, which, as it ſhould ſeem, degrades them no way beneath the rank of other animals of the inſect creation; but we now come to a part of their hiſtory, which proves the imperfection of their organs, from the eaſineſs with which theſe little machines may be damaged and repaired again. It is well known in mechanics, that the fineſt and moſt complicated inſtruments are the moſt eaſily put out of order, and the moſt difficultly ſet right; the ſame alſo obtains in the animal machine.

Man, the moſt complicated machine of all, whoſe nerves are more numerous, and powers of action more various, is moſt eaſily deſtroyed: he is ſeen to die under wounds which a quadruped or a bird could eaſily ſurvive; and as we deſcend gradually to the lower ranks, the ruder the compoſition, the more difficult it is to diſarrange it. Some animals live without their limbs, and often are ſeen to reproduce them; ſome are ſeen to live without their brain for many weeks together; caterpillars continue to increaſe and grow large, though all their nobler organs are entirely deſtroyed within; ſome animals continue to exiſt, though cut in two, their nobler parts preſerving life, while the others periſh that were cut away; but the earth-worm, and all the zoophyte tribe, continue to live in ſeparate parts, and one animal, by the means of cutting, is divided into two diſtinct exiſtences, ſometimes into a thouſand.

Spalanzani has tried ſeveral experiments upon the earth-worm, many of which ſucceeded according to his expectation; every earth-worm, however, did not retain the vivacious principle with the ſame obſtinacy; ſome, when cut in two, were entirely deſtroyed; others ſurvived only in the nobler part; and, while the head was living, the tail entirely periſhed, and a new one was ſeen to burgeon from the extremity. But, what was moſt ſurpriſing of all, in ſome, particularly in the ſmall red-headed earth-worm,

both

both extremities ſurvived the operation; the head produced a tail with the anus, the inteſtines, the annular muſcle, and the prickly beards; the tail part, on the other hand, was ſeen to ſhoot forth the nobler organs, and in leſs than the ſpace of three months ſent forth a head, heart, with all the apparatus and inſtruments of generation. This part, as may eaſily be ſuppoſed, was produced much more ſlowly than the former, a new head taking above three or four months for its completion, a new tail being ſhot forth in leſs than as many weeks. Thus two animals by diſſection, were made out of one, each with their ſeparate appetites, each endued with life and motion, and ſeemingly as perfect, as that ſingle animal whence they derived their origin.

What was performed upon the earth-worm, was found to obtain alſo in many other of the vermicular ſpecies.

The *ſea-worm*, the *white water-worm*, and many of thoſe little worms with feelers, found at the bottom of dirty ditches; in all theſe the nobler organs are of ſuch little uſe, that if taken away, the animal does not ſeem to feel the want of them; it lives in all its parts, and in every part; and, by a ſtrange paradox in nature, the moſt uſeleſs and contemptible life is, of all others, the moſt difficult to deſtroy.

The next genus of zoophytes is that of the STAR-FISH, a numerous tribe, ſhapeleſs and deformed, aſſuming, at different times, different appearances. The ſame animal that now appears round like a ball, ſhortly after flattens as thin as a plate. All of this kind are formed of a ſemi-tranſparent, gelatinous ſubſtance, covered with a thin membrane, and, to an inattentive ſpectator, often appear like a lump of inanimate jelly, floating at random upon the ſurface of the ſea, or thrown by chance on ſhore at the departure of the tide. But, upon a more minute inſpection, they will be found poſſeſſed of life and motion; they will be found to ſhoot forth their arms in every direction, in order to ſeize upon ſuch inſects as are near, and to devour them with great rapacity. Worms, the ſpawn of fiſh, and even muſcles themſelves, with their hard reſiſting ſhell, have been found in the ſtomachs of theſe voracious animals; and, what is very extraordinary, though the ſubſtance of their own bodies be almoſt as ſoft as water, yet they are no way injured by ſwallowing theſe ſhells,

which

which are almoſt of a ſtony hardneſs. They increaſe in ſize as all other animals do. In ſummer, when the water of the ſea is warmed by the heat of the ſun, they float upon the ſurface, and in the dark they ſend forth a kind of ſhining light, reſembling that of phoſphorus.

They are often ſeen faſtened to the rocks, and to the largeſt ſea-ſhells, as if to derive their nouriſhment from them. If they be taken and put into ſpirit of wine, they will continue for many years entire; but if they be left to the influence of the air, they are, in leſs than four and twenty hours, melted down into limpid and offenſive water.

In all of this ſpecies, none are found to poſſeſs a vent for their excrements, but the ſame paſſage by which they devour their food, ſerves for the ejection of their fœces. Theſe animals, as was ſaid, take ſuch a variety of figures, that it is impoſſible to deſcribe them under one determinate ſhape; but, in general, their bodies reſemble a truncated cone, whoſe baſe is applied to the rock to which they are found uſually attached. Though generally tranſparent, yet they are found of different colours, ſome inclining to green, ſome to red, ſome to white, and ſome to brown. In ſome, their colours appear diffuſed over the whole ſurface, in ſome, they are ſtreaked, and in others often ſpotted. They are poſſeſſed of a very ſlow progreſſive motion, and, in fine weather, they are continually ſeen, ſtretching out and fiſhing for their prey. Many of them are poſſeſt of a number of long ſlender filaments, in which they entangle any ſmall animals they happen to approach, and thus draw them into their enormous ſtomachs, which fill the whole cavity of their bodies. The harder ſhells continue for ſome weeks indigeſted, but at length they undergo a kind of maceration in the ſtomach, and become a part of the ſubſtance of the animal itſelf. The indigeſtible parts are returned by the ſame aperture by which they were ſwallowed, and then the ſtar-fiſh begins to fiſh for more. Theſe alſo may be cut in pieces, and every part will ſurvive the operation; each becoming a perfect animal, endued with its natural rapacity. Of this tribe, the number is various, and the deſcription of each would be tedious and uninſtructive; the manners and nature of all, are nearly as deſcribed; but we will juſt make mention of one creature, which, though not properly belonging to this claſs, yet is ſo nearly related, that the paſſing it in ſilence would be an unpardonable omiſſion.

Of all animals, the *cuttle-fiſh*, (See pl. XCII.) though in ſome reſpects ſuperior to this tribe, poſſeſſes qualities the moſt extraordinary. It is about two feet long, covered with a very thin ſkin, and its fleſh compoſed of a gelatinous ſubſtance, which however withinſide is ſtrengthened by a ſtrong bone, of which ſuch great uſe is made by the goldſmith. It is poſſeſſed of eight arms, which it extends, and which are probably of ſervice to it in fiſhing for its prey; while alive, it is capable of lengthening or contracting theſe at pleaſure; but when dead, they contract, and loſe their rigidity. They feed upon ſmall fiſh, which they ſeize with their arms; and they are bred from eggs, which are laid upon the weeds along the ſea-ſhore.

The cuttle-fiſh is found along many of the coaſts of Europe, but are not eaſily caught, from a contrivance with which they are furniſhed by nature; this is a black ſubſtance, of the colour of ink, which is contained in a bladder generally on the left ſide of the belly, and which is ejected in the manner of an excrement from the anus. Whenever, therefore, this fiſh is purſued, and when it finds a difficulty of eſcaping, it ſpurts forth a great quantity of this black liquor, by which the waters are totally darkened; and then it eſcapes, by lying cloſe at the bottom. In this manner the creature finds its ſafety, and men find ample cauſe for admiration, from the great variety of ſtratagems with which creatures are endued for their peculiar preſervation.

The common Polypus, (See pl. XCII.) is found at the bottom of wet ditches, or attached to the under ſurface of the broad-leafed plants that grow and ſwim on the waters. The ſame difference holds between theſe and the ſea-water polypus, as between all the productions of the ſea, and of the land and the ocean. The marine vegetables and animals grow to a monſtrous ſize. The eel, the pike, or the bream of freſh-waters, is but ſmall; but in the ſea, they grow to an enormous magnitude. The herbs of the field are at moſt but a few feet high; thoſe of the ſea often ſhoot forth a ſtalk of a hundred. It is ſo between the polypi of both elements. Thoſe of the ſea are found from two feet in length to three or four, and Pliny has even deſcribed one, the arms of which were no leſs than thirty feet long. Thoſe in freſh waters, however, are comparatively minute; at their utmoſt ſize, ſeldom above three parts of an inch long, and when gathered up into their uſual form, not above a third even of thoſe dimenſions.

It was upon theſe minute animals, that the power of diſſection was firſt tried in multiplying their numbers. They had been long conſidered as little worthy the attention of obſervers, and were conſigned to that neglect in which thouſands of minute ſpecies of inſects remain to this very day. It is true, indeed, that Reaumur obſerved, claſſed, and named them. By contemplating their motions, he was enabled diſtinctly to pronounce on their being of the animal, and not of the vegetable kingdom; and he called them polypi, from their great reſemblance to thoſe larger ones that were found in the ocean. Still, however, their properties were neglected, and their hiſtory unknown.

Mr. Trembley was the perſon to whom we owe the firſt diſcovery of the amazing properties and powers of this little vivacious creature: he divided this claſs of animals into four different kinds; into thoſe inclining to green, thoſe of a browniſh caſt, thoſe of fleſh colour, and thoſe which he calls the polype de panache. The differences of ſtructure in theſe, as alſo of colour are obſervable enough; but the manner of their ſubſiſting, of ſeizing their prey, and of their propagation, is pretty nearly the ſame in all.

Whoever has looked with care into the bottom of a wet ditch, when the water is ſtagnant, and the ſun has been powerful, may remember to have ſeen many little tranſparent lumps of jelly, about the ſize of a pea, and flatted on one ſide; ſuch alſo as have examined the under ſide of the broad-leafed weeds that grow on the ſurface of the water, muſt have obſerved them ſtudded with a number of theſe little jelly-like ſubſtances, which were probably then diſregarded, becauſe their nature and hiſtory was unknown. Theſe little ſubſtances, however, were no other than living polypi gathered up into a quieſcent ſtate, and ſeemingly inanimate, becauſe either undiſturbed, or not excited by the calls of appetite to action. When they are ſeen exerting themſelves, they put on a very different appearance from that when at reſt; to conceive a juſt idea of their figure, we may ſuppoſe the finger of a glove cut off at the bottom; we may ſuppoſe alſo ſeveral threads or horns planted round the edge like a fringe. The hollow of this finger will give us an idea of the ſtomach of the animal; the threads iſſuing forth from the edges may be conſidered as the arms or feelers, with which it hunts for its prey. The animal, at its greateſt extent, is ſeldom ſeen above an inch and a half long, but it is much ſhorter when it is contracted and at reſt; it is furniſhed neither with muſcles nor rings, and its manner of lengthening or contracting itſelf more reſembles that of the ſnail than worms, or any other inſect. The polypus contracts itſelf more or leſs, in proportion as it is touched, or as the water is agitated in which they are ſeen. Warmth animates them, and cold benumbs them; but it requires a degree of cold approaching congelation, before they are reduced to perfect inactivity; thoſe of an inch have generally their arms double, often thrice as long as their bodies. The arms, where the animal is not diſturbed, and the ſeaſon not unfavourable, are thrown about in various directions, in order to ſeize and entangle its little prey; ſometimes three or four of the arms are thus employed, while the reſt are contracted like the horns of a ſnail, within the animal's body. It ſeems capable of giving what length it pleaſes to theſe arms; it contracts and extends them at pleaſure, and ſtretches them only in proportion to the remoteneſs of the object it would ſeize.

Theſe animals have a progreſſive motion, which is performed by that power they have of lengthening and contracting themſelves at pleaſure; they go from one part of the bottom to another; they mount along the margin of the water, and climb up the ſide of aquatic plants. They often are ſeen to come to the ſurface of the water, where they ſuſpend themſelves by their lower end. As they advance but very ſlowly, they employ a great deal of time in every action, and bind themſelves very ſtrongly to whatever body they chance to move upon as they proceed; their adheſion is voluntary, and is probably performed in the manner of a cupping-glaſs applied to the body.

All animals of this kind have a remarkable propenſity to turn towards the light, and this naturally might induce an enquirer to look for their eyes; but however carefully this ſearch has been purſued, and however excellent the microſcope with which every part was examined, yet nothing of the appearance of this organ was found over the whole body: and it is moſt probable, that, like ſeveral other inſects which hunt their prey by their feeling, theſe creatures are unfurniſhed with advantages which would be totally uſeleſs for their ſupport.

In the center of the arms, as was ſaid before, the mouth is placed, which the animal can open and ſhut at pleaſure, and this ſerves at once as a paſſage for food, and an opening for it after digeſtion. The inward part of the animal's body ſeems to be one great ſtomach, which is open at both ends; but the purpoſes which the opening at the bottom ſerves are hitherto unknown, but certainly not for excluding their excrements, for thoſe are ejected at the aperture by which they are taken in. If the ſurface of the body of this little creature be examined with a microſcope, it will be found ſtudded with a number of warts, as alſo the arms, eſpecially when they are contracted; and theſe tubercles, as we ſhall preſently ſee, anſwer a very important purpoſe.

If we examine their way of living, we ſhall find theſe inſects chiefly ſubſiſting upon others, much leſs than themſelves; particularly a kind of millepedes that live in the water, and a very ſmall red worm, which they ſeize with great avidity. In ſhort, no inſect whatſoever, leſs than themſelves, ſeems to come amiſs to them: their arms, as was obſerved above, ſerve them as a net would a fiſherman, or perhaps more exactly ſpeaking, as a lime-twig does a fowler. Wherever their prey is perceived, which the animal effects by its feeling, it is ſufficient to touch the object it would ſeize upon, and it is faſtened without a power of eſcaping. The inſtant one of this inſect's long arms is laid upon a millepede, the little inſect ſticks without a poſſibility of retreating. The greater the diſtance at which it is touched, the greater is the eaſe with which the polypus brings the prey to its mouth. If the little object be near, though irretrievably caught, it is not without great difficulty that it can be brought to the mouth and ſwallowed. When the polypus is unſupplied with prey, it teſtifies its hunger by opening its mouth; the aperture, however, is ſo ſmall, that it cannot be eaſily perceived; but when, with any of its long arms, it has ſeized upon its prey, it then opens the mouth diſtinctly enough, and this opening is always in proportion to the ſize of the animal which it would ſwallow; the lips dilate inſenſibly by ſmall degrees, and adjuſt themſelves preciſely to the figure of their prey. Mr. Trembley, who took a pleaſure in feeding this uſeleſs brood, found that they could devour aliments of every kind, fiſh and fleſh as well as inſects; but he owns they did not thrive ſo well upon beef and veal, as upon the little worms of their own providing. When he gave one of theſe famiſhed reptiles any ſubſtance which was improper to ſerve for aliment, at firſt it ſeized the prey with avidity, but after keeping it ſome time entangled near the mouth, let it drop again with diſtinguiſhed nicety.

When ſeveral polypi happen to fall upon the ſame worm, they diſpute their common prey with each other. Two of them are often ſeen ſeizing the ſame worm at different ends, and dragging it in oppoſite directions with great force. It often happens, that while one is ſwallowing its reſpective end, the other is alſo employed in the ſame manner, and thus they continue ſwallowing each his part, until their mouths meet together; they then reſt, each for ſome time in this ſituation, till the worm breaks between them, and each goes off with his ſhare; but it often happens, that a ſeemingly more dangerous combat enſues, when the mouths of both are thus joined upon one common prey together: the largeſt polypus then gapes and ſwallows his antagoniſt; but, what is very wonderful, the animal thus ſwallowed, ſeems to be rather a gainer by the misfortune. After it has lain in the conqueror's body for about an hour, it iſſues unhurt, and often in poſſeſſion of the prey which had been the original cauſe of contention; how happy would it be for men, if they had as little to fear from each other!

Theſe reptiles continue eating the whole year, except when the cold approaches to congelation; and then, like moſt others of the inſect tribe, they feel the general torpor of nature, and all their faculties are for two or three months ſuſpended; but if they abſtain at one time, they are equally voracious at another, and, like ſnakes, ants, and other animals that are torpid in winter, the meal of one day ſuffices them for ſeveral months together. In general, however, they devour more largely in proportion to their ſize, and their growth is quick exactly as they are fed; ſuch as are beſt ſupplied, ſooneſt acquire their largeſt ſize, but they diminiſh alſo in their growth with the ſame facility, if their food be taken away.

Such are the more obvious properties of theſe little animals, but the moſt wonderful ſtill remain behind: Their manner of propagation, or rather multiplication, has for

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ſome years been the aſtoniſhment of all the learned of Europe. They are produced in as great a variety of manners as every ſpecies of vegetable. Some polypi are propagated from eggs, as plants are from their ſeed; ſome are produced by buds iſſuing from their bodies, while all may be multiplied by cuttings, and this to a degree of minuteneſs that exceeds even philoſophical perſeverance.

With reſpect to ſuch of this kind as are hatched from the egg, little curious can be added; but with regard to ſuch as are produced like buds from their parent ſtem, or like cuttings from an original root, their hiſtory requires a more detailed explanation. If a polypus be carefully obſerved in ſummer, when theſe animals are chiefly active, and more particularly prepared for propagation, it will be found to burgeon forth, from different parts of its body, ſeveral tubercles, or little knobs, which grow larger and larger every day; after two or three days inſpection, what at firſt appeared but a ſmall excreſcence, takes the figure of a ſmall animal, entirely reſembling its parent, furniſhed with feelers, a mouth, and all the apparatus for ſeizing and digeſting its prey. This little creature every day becomes larger, like the parent, to which it continues attached; it ſpreads its arms to ſeize upon whatever inſect is proper for aliment, and devours it for its own particular benefit; thus it is poſſeſſed of two ſources of nouriſhment, that which it receives from the parent by the tail, and that which it receives from its own induſtry by the mouth. The food which theſe animals receive often tinctures the whole body, and upon this occaſion the parent is often ſeen communicating a part of its own fluids to that of its progeny that grows upon it; while, on the contrary, it never receives any tincture from any ſubſtance that is caught and ſwallowed by its young. If the parent ſwallows a red worm, which gives a tincture to all its fluids, the young one partakes of the parental colour; but if the latter ſhould ſeize upon the ſame prey, the parent polypus is no way benefited by the capture, but all the advantage remains with the young one.

But we are not to ſuppoſe that the parent is capable of producing only one at a time; ſeveral young ones are thus ſeen at once, of different ſizes, growing from its body, ſome juſt budding forth, others acquiring their perfect form, and others come to ſufficient maturity, and juſt ready to drop from the original ſtem, to which they had been attached for ſeveral days. But, what is more extraordinary ſtill, thoſe young ones themſelves that continue attached to their parent, are ſeen to burgeon, and propagate their own young ones alſo, each holding the ſame dependence upon its reſpective parents, and poſſeſſed of the ſame advantages that have been already deſcribed in the firſt connection.

This ſeems to be the moſt natural way by which theſe inſects are multiplied; their production from the egg being not ſo common; and though ſome of this kind are found with a little bladder attached to their bodies, which is ſuppoſed to be filled with eggs, which afterwards come to maturity, yet the artificial method of propagating theſe animals, is much more expeditious, and equally certain: it is indifferent whether one of them be cut into ten, or ten hundred parts, each becomes as perfect an animal as that which was originally divided; but it muſt be obſerved, that the ſmaller the part which is thus ſeparated from the reſt, the longer it will be in coming to maturity, or in aſſuming its perfect form.

Beſides theſe kinds mentioned by Mr. Trembley, there are various others which have been lately diſcovered, by the vigilance of ſucceeding obſervers, and ſome of theſe ſo ſtrongly reſemble a flowering vegetable in their forms, that they have been miſtaken by many naturaliſts for ſuch.

Mr. Hughes, the author of the Natural Hiſtory of Barbadoes, has deſcribed a ſpecies of this animal, but has miſtaken its nature, and called it a ſenſitive flowering plant; he obſerved it to take refuge in the holes of rocks, and, when undiſturbed, to ſpread forth a number of ramifications, each terminated by a flowery petal, which ſhrunk at the approach of the hand, and withdrew into the hole, whence before it had been ſeen to iſſue. This plant, however, was no other than an animal of the polypus kind, which is not only to be found in Barbadoes, but alſo on many parts of the coaſt of Cornwall, and along the ſhores of the Continent.

LITHOPHYTES and SPONGES.] If we examine the bottom of the ſea, along ſome ſhores, and particularly at the mouths of ſeveral rivers, we ſhall find it has the appearance of a foreſt of trees under water, millions of plants growing in various directions, with their branches entangled in each other, and ſometimes ſtanding ſo thick as to obſtruct navigation. The ſhores of the Perſian gulph, the whole extent of the Red Sea, and the weſtern coaſts of America, are ſo choaked up in many places with theſe coraline ſubſtances, that though ſhips force a paſſage through them, boats and ſwimmers find it impoſſible to make their way. Theſe aquatic groves are formed of different ſubſtances, and aſſume various appearances.

The *coral* plants, as they are called, ſometimes ſhoot out like trees without leaves in winter; they often ſpread out a broad ſurface like a fan, and not uncommonly a large bundling head, like a faggot; ſometimes they are found to reſemble a plant with leaves and flowers; and often the antlers of a ſtag, with great exactneſs and regularity. In other parts of the ſea are ſeen ſponges, of various magnitude, and extraordinary appearances, aſſuming a variety of phantaſtic forms, like large muſhrooms, mitres, fonts, and flower-pots.

If in our reſearches after the nature of theſe plants, we ſhould be induced to break off a branch of the coraline ſubſtance, and obſerve it carefully, we ſhall perceive its whole ſurface, which is very rugged and irregular, covered with a mucous fluid, and almoſt in every part ſtudded with little jelly-like drops, which, when cloſely examined, will be found to be no other than inſects of the polypus kind. Theſe have their motions, their arms, their appetites exactly reſembling thoſe deſcribed in the laſt chapter, but they ſoon expire when taken out of the ſea, and our curioſity is at once ſtopped in its career, by the animals ceaſing to give any inſtance of their induſtry; recourſe, therefore, has been had to other expedients, in order to determine the nature of the inhabitant, as well as the habitation.

If a coraline plant be ſtrictly obſerved, while ſtill growing in the ſea, and the animals upon its ſurface be not diſturbed, either by the agitation of the waters, or the touch of the obſerver, the little polypi will then be ſeen in infinite numbers, each iſſuing from its cell, and in ſome kinds, the head covered with a little ſhell, reſembling an umbrella, the arms ſpread abroad, in order to ſeize its prey, while the hinder part ſtill remains attached to its habitation, whence it never wholly removes. By this time it is perceived that the number of inhabitants is infinitely greater than was at firſt ſuſpected; that they are all aſſiduouſly employed in the ſame purſuits, and that they iſſue from their reſpective cells, and retire into them at pleaſure. Still, however, there are no proofs that thoſe large branches which they inhabit are entirely the conſtruction of ſuch feeble and minute animals. But chemiſtry will be found to lend a clue to extricate us from our doubts in this particular. Like the ſhells which are formed by ſnails, muſcles, and oyſters, theſe coraline ſubſtances effervesce with acids, and may therefore well be ſuppoſed to partake of the ſame animal nature. But Mr. Ellis went ſtill farther, and examined their operations, juſt as they were beginning. Obſerving an oyſter-bed which had been for ſome time neglected, he there perceived the firſt rudiments of a coraline plantation, and tufts of various kinds ſhooting from different parts of this favourable ſoil. It was upon theſe he tried his principal experiment. He took out the oyſters which were thus furniſhed with coralines, and placed them in a large wooden veſſel, covering them with ſea-water. In about an hour, he perceived the animals, which before had been contracted by handling, and had ſhewn no ſigns of life, expanding themſelves in every direction, and appearing employed in their own natural manner. Perceiving them therefore in this ſtate, his next aim was to preſerve them thus expanded, ſo as to be permanent objects of curioſity. For this purpoſe he poured, by ſlow degrees, an equal quantity of boiling-water into the veſſel of ſea-water in which they were immerſed. He then ſeparated each polypus with pincers from its ſhell, and plunged each ſeparately into ſmall cryſtal vaſes, filled with ſpirit of wine mixed with water. By this means, the animal was preſerved entire, without having time to contract itſelf, and he thus perceived a variety of kinds, almoſt equal to that variety of productions which theſe little animals are ſeen to form.

He has been thus able to perceive and deſcribe fifty different kinds, each of which is ſeen to poſſeſs its own peculiar mode of conſtruction, and to form a coraline that none of the reſt can imitate. It is true, indeed, that on every coraline ſubſtance there are a number of polypi found, no way reſembling thoſe which are the erectors of the building.

But, in general, the ſame difference that ſubſiſts between the honeycomb of the bee, and the paper-like cells of the waſp, ſubſiſts between the different habitations of the coral-making polypi.

With regard to the various forms of theſe ſubſtances, they have obtained different names from the nature of the animal that produced them, or the likeneſs they bear to ſome well-known object, ſuch as *coralines*, *fungimadripores*, *ſponges*, *aſtroites*, and *keratophytes*.

When examined chemically, they all diſcover the marks of animal formation; the corals, as was ſaid, diſſolve in acids, the ſponges burn with an odour ſtrongly reſembling that of burnt horn. We are left ſomewhat at a loſs with regard to the preciſe manner in which this multitude of cells, which at laſt aſſume the appearance of a plant or flower, are formed. If we may be led in this ſubject by analogy, it is moſt probable, that the ſubſtance of coral is produced in the ſame manner that the ſhell of the ſnail grows round it; theſe little reptiles are each poſſeſſed of a ſlimy matter, which covers its body, and this hardening, as in the ſnail, becomes an habitation exactly fitted to the body of the animal that is to reſide in it; ſeveral of theſe habitations being joined together, form, at length, a conſiderable maſs, and, as moſt animals are productive, in proportion to their minuteneſs, ſo theſe multiplying in a ſurpriſing degree, at length form thoſe extenſive foreſts that cover the bottom of the deep.

CHAP XL.

Of the Vegetable World—Theory of Vegetation—Anatomy of Plants—Circulation of the Vegetable Juices—Fructification, &c. of Plants—Of the Sexual Syſtem—The Science of Botany—The Claſſes, Orders, and Genera of Linnæus——The natural Claſſification of Vegetables——Concluſion.

IN the progreſs of our examination of the natural world, with our illuſtrious philoſopher, we commenced with a ſlight examination of the materials of which this ALL is compoſed; we detailed what is generally known of the formation, ſtructure, and principal phenomena of the earth. We took a ſhort review of man in his various relations and ſituations; and ſucceſſively paſſed through the ſeveral gradations of animal nature. From that inſenſible, and almoſt inanimate claſs of beings of which we ſo lately treated, the tranſition to the vegetable world is eaſy; a department which preſents to the caſual obſerver an almoſt infinite variety—but the variety is only external; the nature, the habits, the manners (if we may ſo expreſs ourſelves) of all vegetables nearly reſemble each other, and we muſt be content with little more than mere claſſification and arrangement, unleſs we would depart from the province of the naturaliſt to intrude upon thoſe of the chemiſt, the phyſician, or the farmer.

Of the theory of vegetation, or of the growth, propagation, and nutriment of vegetables, our knowledge is ſlight and ſuperficial. A cloſe inſpection into the ſtructure of plants, affords the beſt ground for reaſoning on this ſubject, and, indeed, every thing beyond it is little better than mere fancy and conjecture.

On making a tranſverſe ſection of a tree, it appears to conſiſt of three diſtinct parts—the bark, the wood, and the medulla, or pith.

1. The bark conſiſts of two parts, the cuticle, and the true bark. The cuticle of plants affords an external covering to all their parts. It conſiſts of numerous layers, eaſily ſeparable from each other, and of which the fibres are

circular. The true bark may be conſidered as a congeries of cellular ſubſtance, in which are placed two kinds of organs, the veſſels peculiar to the plants, and the longitudinal fibres. Of the uſe of theſe, nothing can be ſaid at preſent.

2. On removing the bark, the wood appears. Its ſubſtance is denſer than the bark, and its ſtructure more difficult to be demonſtrated. But it has been diſcovered likewiſe to contain vaſa propria, and longitudinal fibres, and, beſides theſe, large veſſels with ſpiral coats, which run from one end of the tree to the other, and are denominated vaſa aëra, or air veſſels. Between the wood and the pith lies a green coloured ſubſtance, firſt accurately deſcribed by Dr. John Hill, and by him affirmed to contain all the parts of the plant in embryo: he gave it the name of Corona.

3. In the centre of the tree reſides the pith, which, in young plants, is very abundant. As they approach to maturity it grows drier, and appears in a ſmaller quantity; and, in very aged trees, it is entirely obliterated. Its ſubſtance is cellular, and, according to the author juſt mentioned, it is of a ſimilar ſtructure in all plants. Theſe are the ſolid parts of vegetables.

But there are likewiſe fluids, or juices in vegetables: and theſe are of two kinds. The one is of the ſame nature in all the variety of vegetables: the other varies according to the different plants in which it exiſts. The former, which is called the *ſuccus communis*, when collected early in the ſpring, from an inciſion made in the birch or vine, differs little from common water. The latter, which is named the *ſuccus proprius*, poſſeſſes various properties in various plants, and gives to each its ſenſible qualities. Theſe two juices never mingle with each other in the tree, and the latter is found in the *vaſa propria* only.

It is not yet aſcertained, whether the juices of plants are tranſmitted through veſſels, or a cellular ſubſtance. Each ſide of the queſtion has had its advocates, who have ſupported their reſpective opinions with probable arguments; but it is to be regretted, that, on ſo intereſting a ſubject, no concluſion can be formed from the actual diſſection of vegetables. It, however, ſeems moſt probable, that all the fluids of plants are tranſmitted through veſſels.

Of the Courſe of the SUCCUS COMMUNIS, or *Sap*.] Botaniſts have made many experiments to aſcertain the courſe of the ſap. Early in the ſpring, when the ſap begins to flow, inciſions have been made in the trunk and branches of trees, as far as the pith; and, in ſuch caſes, it has been conſtantly found, that a larger quantity of ſap flowed from the ſuperior, than from the inferior margin of the inciſion. This circumſtance led to the opinion, that in the beginning of the ſpring, great quantities of moiſture are abſorbed by trees from the atmoſphere, and hence the ſource of the abundance of ſap. But this concluſion is found to diſagree with the phenomena of nature, from the two following experiments.

1. Inciſions of various heights being made in the ſtem of ſeveral plants, their roots were immerſed in a decoction of logwood. The roots abſorbed the coloured liquor, which at length began to flow from the ſuperior, and not from the inferior margins of the inciſions; nor had the liquor extended itſelf much upwards, beyond the margin of the inciſion from which it was diſcharged.

2. In the ſeaſon when the ſap flows moſt abundantly, called the bleeding ſeaſon, a deep cut was made into the branch of a growing vine, and the greateſt quantity of ſap was diſcharged from the upper margin of the inciſion: but a branch of the ſame tree, cut in the ſame manner, being inverted, the ſap flowed moſt copiouſly from the other margin of the inciſion, which of courſe was now that next the root. On the other hand, many experiments may be brought to prove directly, that, in the bleeding ſeaſon, the ſap aſcends from the roots towards the branches; the following however may ſuffice.

1. Early in the ſpring, when little or no ſap had as yet entered the plant, Dr. Hope made a number of inciſions, of different altitudes, into the root and ſtem of a birch. As the ſap roſe, it firſt flowed from the ſuperior margin of the loweſt inciſion, and then, in regular ſucceſſion, from the upper margins of the other inciſions, till, at laſt, it reached the higheſt.

2. If, in the beginning of the bleeding ſeaſon, before the ſap is found in the ſtem or branches, an inciſion be made in the root of a vine, a conſiderable flow of ſap will follow the wound.

3. The quantity of ſap is very generally proportioned to the humidity of the ſoil.

Of the courſe of the SUCCUS PROPRIUS.] When a portion of the bark and wood of the pine, is cut from the ſtem, the *ſuccus proprius* flows in conſiderable quantity, both from the upper and under margin of the inciſion. Hence it occurred to botaniſts, that this juice might have little or no motion, and that its efflux from ſuch an orifice might depend entirely on its being freed from the preſſure of the bark and wood. But we cannot accede to this opinion: for although in the beginning, the *ſuccus proprius* flows from both margins of the inciſion, in a little while, it is diſcharged from the ſuperior margin only.

Hence it appears clearly, that the courſe of this juice, in its veſſels, is never from the roots towards the branches, but always in the contrary direction.

Beſides the veſſels of the ſuccus proprius, and thoſe conveying the ſap, a third kind are found in vegetables, named air-veſſels, or *vaſa aëria*. Theſe are chiefly ſituated in the wood, leaves, and petals; but are wanting in the bark of trees, and in the herbaceous plants. They are formed by a number of ſmall filaments, ſpirally rolled up, ſo as to form a cavity in the middle. The name of *vaſa aëria* has been given them, becauſe they are empty of liquor, and becauſe a great quantity of air is certainly found in the wood of plants, where theſe veſſels are chiefly placed, and where there is no peculiar organization. They are ſuppoſed to be the inſtruments of reſpiration in vegetables; but in what manner this function is performed, is not clearly underſtood.

Dr. Hill has demonſtrated, that the cuticle of plants is an organized ſubſtance, containing veſſels. In trees and ſhrubs theſe veſſels have an external opening; but in the herbaceous plants this is wanting. Trees and ſhrubs only are poſſeſſed of *vaſa aëria*, and, when a plant is placed under the exhauſted receiver of an air-pump, the air enters through the cuticle, and only iſſues from the wood, in which the *vaſa aëria* are ſituated. From theſe circumſtances taken together, and conſidered attentively, we have reaſon to conclude, that the air's proper entrance to the *vaſa aëria* is through theſe cuticular veſſels. Thus, in the early part of the ſpring, the gentle heat expands the mouths of theſe veſſels, before contracted by the winter's cold. Into theſe orifices the external air ruſhes and preſſes down to the roots. To theſe it gives energy, as it does to the moving fibres of animals; and, by its preſſure, it may aſſiſt in propelling the juices upwards. An additional quantity of air is evolved by the internal motions of the plant, and the whole paſſes off with the perſpirable matter. In this way, there ſeems to be a circulation of air through plants, aſſiſting and aſſiſted by the powers which move the juices.

On this account, trees overgrown with moſs have few leaves, weak ſhoots, and no fruit. The practice of gardeners is, therefore, to be commended, who, in the ſpring, ſtrip the moſs from the bark of aged trees, and thus admitting the acceſſion of the air, reſtore them to verdure and fruitfulneſs.

Having conſidered the courſe of the fluids in vegetables, we next proceed to examine the powers by which theſe fluids are moved.

Capillary attraction has generally been accounted the cauſe of the motion of the juices of plants; and the permanence of the action of this power has been ſuppoſed to depend on the evaporation from the leaves. Of late years, indeed, botaniſts have aſcribed to plants a vital power, which they believe aſſiſts the flow of the juices; and this opinion is ſupported by the following reaſons.

1. The deſcent of the juices, that is, their return from the branches to the roots, cannot be explained without the ſuppoſition of a vital power regulating the motion. A flow of fluids, through capillary tubes, will only take place, when the reſiſtance, at the one end is diminiſhed. This might account for the riſing of the ſap, when warmth is applied to the leaves, but cannot account for its deſcending in the ſame circumſtances, that is, when the atmoſphere is warmer than the earth. But this takes place conſtantly, with reſpect to the ſuccus proprius, and, it is probable, that part of the ſap has the ſame courſe, both in the day and night.

2. The exertions of many plants, on the application of ſtimuli, afford another argument in ſupport of their muſcular power, and the ſpontaneous motions of other plants confirm the ſame opinion.

3. Light, admitted to plants, increaſes their perſpiration, and cauſes a leaf, before inverted, to reſume its natural poſition. The influence of darkneſs contracts theſe effects, and it produces what is called ſleep in plants, although the heat of the atmoſphere be not diminiſhed. Theſe facts ſeem to prove the irritability, or muſcular power of vegetables.

4. If the fluids of plants are conveyed through veſſels, can we ſuppoſe theſe tubes to be of ſo ſmall a diameter, as, by capillary attraction alone, to raiſe the juices from the roots to the ſummits of the loftieſt trees?

5. On the ſuppoſition of the fluids being moved entirely by capillary attraction, how happens it, that the ſap of the vine flows from an inciſion made in the ſpring, and not from one made in ſummer? In this caſe, as the veſſels remain the ſame, and the heat is at leaſt not diminiſhed, the efflux of ſap ought to be equally copious in ſummer as in ſpring.

6. Capillary tubes, filled with liquor, do not diſcharge their contents when broken acroſs. But from the ſtem of a vine, cut tranſverſely, a large quantity of fluids is diſcharged, as has been demonſtrated by Dr. Hales.

Plants, as well as animals, perſpire, and, in both caſes, this function is eſſential to health. By the experiments of Dr. Hales, and M. Guettard, it appears, that the perſpirable matter of vegetables differs in no reſpect from pure water, excepting that it becomes rather ſooner putrid. The quantity perſpired varies, according to the extent of the ſurface from which it is emitted, the temperature of the air, the time of the day, and the humidity of the atmoſphere. As the leaves form the greateſt part of the ſurface, it is natural to ſuppoſe, that the quantity of theſe will very materially affect the quantity of the perſpiration. Accordingly, the experiments of Dr. Hales have aſcertained, that the perſpiration of vegetables is increaſed or diminiſhed, chiefly, in proportion to the increaſe or diminution of their foliage. The degree of heat in which the plant was kept, according to the ſame author, varied the quantity of matter perſpired; this being greater, in proportion to the greater heat of the ſurrounding atmoſphere. The degree of light has likewiſe conſiderable influence in this reſpect: for Mr. Phillip Miller's experiments prove, that plants uniformly perſpire moſt in the forenoon, though the temperature of the air, in which they are placed, ſhould be unvaried. Mr. Guettard likewiſe informs us, that a plant, expoſed to the rays of the ſun, has its perſpiration increaſed to a much greater degree, than if it had been expoſed to the ſame heat, under the ſhade. Finally, the perſpiration of vegetables is increaſed in proportion as the atmoſphere is dry, or, in other words, diminiſhed in proportion as the atmoſphere is humid.

The more vigorous and healthy the plant, the more copious the perſpiration; this function, like the reſt, depending much on the vital energy. Exceſſive perſpiration ſeems to hurt, and even ſometimes to deſtroy vegetables; defective perſpiration is equally injurious. It is alſo found, that this function is performed, chiefly, if not altogether, by the leaves and young ſhoots. That it may be properly carried on, all leaves are deciduous; in thoſe trees called ever-greens, there being a conſtant ſucceſſion of leaves, to prevent the organ of perſpiration from becoming rigid.

Dr. Hales firſt obſerved, that a quantity of moiſture is abſorbed by plants, when expoſed to a humid atmoſphere. This abſorption, as well as the perſpiration, is performed by the leaves; but in what manner has not yet been aſcertained. Experiments made by M. Guettard ſhew, that perſpiration is more conſiderable from the upper, than from the under ſurface of leaves, and thoſe of the ſame author, of Duhamel and Bonnet demonſtrate, that abſorption, on the contrary, is much greater at the inferior ſurface than at the ſuperior. To prove this, the ſuperior ſurface of one leaf, and the inferior ſurface of another, were covered with varniſh, and the conſequence was, that the former, in a given time, ſuffered little diminution of weight, but the latter became much lighter. Again, ſimilar leaves were laid upon a ſurface of water, and it followed, that thoſe which had their ſuperior ſurface inverted, gained little weight, and for the moſt part died in a few days; while ſuch as had their inferior ſurface applied to the water, became much heavier, and flouriſhed many months. Theſe facts make it evident, that perſpiration, and abſorption, are not performed by the ſame veſſels, but that each has its peculiar organs.

It has been commonly ſuppoſed, that perſpiration takes place, chiefly, when the air is warm; and abſorption, on the other hand, when it is cold and moiſt. But, unleſs the veſſels peculiar to abſorption, which are placed in the under ſurface of the leaves, were kept conſtantly in action, they would neceſſarily collapſe or decay. All abſorbing organs have a peculiar ſtructure, and an action depending on life: that ſuch an organization is preſent in the leaves of plants, it is reaſonable to conclude, becauſe dried leaves do not abſorb. The ſame reaſoning is applicable to the abſorption performed by the roots: for when a ſmall portion of the root of a hyacinth, growing in water, is cut off, the whole root dies, and new roots are ſhot out, having their extremities peculiarly adapted to the abſorption of nouriſhment.

The noxious matter, carried off by perſpiration, requires large dilution to prevent its hurting the delicate ſtructure of the leaves, and in this ſtate accordingly it is thrown out on their ſurface. Here the noxious part is excreted, but part of the diluting fluid is reabſorbed, to ſerve the purpoſe of ſecretion, which could not be performed, unleſs the common juice, or ſap, were previouſly prepared. In the ſame manner, in the animal body, the ſaline and putrid matter, carried off by the urine, muſt be liberally diluted, to prevent it from injuring the tender ſtructure of the kidneys; yet, when it is ſafely lodged in the bladder, a part is reabſorbed, and the groſſer excrementitious matter is alone thrown out. Something of the ſame kind happens in the perſpiration of animals. They certainly take in ſomething uſeful from the ſurface of their bodies, and this is probably performed by veſſels opening outwards, different from the common exhalents. The great quantity of water, abſorbed during the uſe of the pediluvium, and that ſingular ſymptom in diabetes, of the patient's voiding a much greater quantity of urine, than there is liquor taken in by the mouth, ſeem to confirm this aſſertion.

Plants are poſſeſſed of a power of forming their different parts, and this is done by ſecretion. We may conjecture what the agents are which produce this effect, but in reſpect to the manner of their operation, we are entirely in the dark. In animals, where the vital power is ſtrong, this is the principal agent in producing the new arrangement of parts, which is made in every ſecretion; but in plants, where this power is weaker, it would be unequal to perform the function, if it were not aſſiſted by abſorption and fermentation. Wherever any firm matter is to be ſecreted, the veſſels have a convoluted courſe, to allow the juice to be fermented, and the thinner parts to be abſorbed. In this manner, the ſtones and kernels of fruits are ſupplied with nouriſhment by fibres, which are much convoluted. The proper juice ſeems to be formed only when the ſap has aſcended towards the leaves, and is deſcending to the roots.

The pabula, from which vegetables receive the matter of ſecretion, are contained in the ſurrounding elements.

Some botaniſts have conceived, that plants, as well as animals, have a regular circulation of their fluids. Others think this very improbable. On both ſides, recourſe has been had to experiments; and from theſe, concluſions, perfectly oppoſite, have been deduced. When a ligature has been fixed round a tree, in ſuch a manner, that no juice could be tranſmitted through the bark, the tree has been found to thicken above the ligature; but below it, to continue of the ſame circumference. Hence ſome have concluded, that the ſap aſcends through the wood, and deſcends through the bark. Thoſe who are of a contrary opinion, have found, that, in certain caſes, the juice aſcends through the bark only: for when a portion of the wood has been cut out, and the bark exactly replaced, the growth of the tree has been found to go on unchanged: hence it is ſaid, that the juice is tranſmitted equally through all parts of vegetables. The experiments adduced on each ſide of the queſtion are juſt, but the reaſonings on theſe, by each party, ſeem equally inconcluſive. The analogy of animal nature appears to favour the opinion, that the juice riſes through the wood only, and deſcends only through the bark; but this analogy is not complete throughout. The arteries are not placed in the internal parts alone, nor the veins in the external, but they accompany each other through every part of their diſtribution.

In vegetables, the ſap riſes *from* the roots, but the proper juice deſcends *towards* them; in the deſcent of the juice, the wood acquires its growth, and abſorption is a conſtant action of the leaves. Theſe obſervations render it probable, that there is a circulation of the juices; and if there be, the veſſels which perform it, we may reaſonably believe, accompany each other through every part of their courſe.

A perfect plant is compoſed of a root, of a ſtem with its branches, of leaves, flower, and fruit, for in botany, by fruit, in herbs as well as in trees, we underſtand the whole fabric of the ſeed. But there is a principal part which requires an examination more at large; the *fructification*, that is, the *flower* and the *fruit*. For on this part Linnæus has founded his celebrated Syſtem of Botany. To underſtand this, take a lily, for inſtance. Before it opens, there is evidently, at the top of the ſtem, an oblong greeniſh bud, which grows whiter the nearer it is to opening; and when it is quite open, we perceive that the white cover takes the form of a baſon, or vaſe, divided into ſeveral ſegments. This is called the *corolla*, and not the flower, as it is by the vulgar, becauſe the flower is a compoſition of ſeveral parts, of which the corolla is only the principal.

The corolla of the lily is not of one piece. When it withers and falls, it ſeparates into ſix diſtinct pieces, which are called *petals*. Thus the corolla of the lily is compoſed of ſix petals. A corolla, conſiſting of ſeveral pieces like this is called a *polypetalous* corolla. If it were all of one piece, like the bell-flower, or bind-weeds, it would be called *monopetalous*.

Exactly in the middle of the corolla is a ſort of little column riſing from the bottom, and pointing directly upwards. This, taken in its whole, is called the *piſtil*, or *pointal:* taken in its parts, it is divided into three. 1. The ſwollen baſe, with three blunted angles, called the *germ*, or *ovary*. 2. A thread placed upon this, called the *ſtyle*. 3. The ſtyle crowned by a ſort of capital, with three notches: this capital is called the *ſtigma*.

Between the piſtil and the corolla of the lily, there are ſix other bodies, entirely ſeparate from each other, which are called the ſtamens. Each ſtamen is compoſed of two parts, one long and thin, by which it is faſtened to the bottom of the corolla, and called the *filament*; the other thicker, placed at the top of the filament, and called *anthera*, or *anther*. Each anther is a box which opens when it is ripe, and throws out a yellow duſt, which has a ſtrong ſmell; this is called *pollen*, or *farina*.

Such is the general analyſis of the parts which conſtitute a flower. As the corolla fades and falls, the germ increaſes, and becomes an oblong triangular capſule, within which are flat ſeeds in three cells. This capſule, conſidered as the cover of the ſeeds, takes the name of *pericarpium*.

The parts here mentioned, are found in the flowers of moſt other plants, but in different proportion, ſituation, and number. By the analogy of theſe parts, and their different combinations, the families of the vegetable kingdom are determined; and theſe analogies are connected with others, in thoſe parts of the plant which ſeem to have no relation to them. For inſtance, this number of ſix ſtamens, ſometimes only three, of ſix petals or diviſions of the corolla, and that triangular form of the germ, with its three cells, determine the liliaceous tribe; and in all this tribe, which is very numerous, the roots are *bulbs* of ſome ſort or other. That of the lily is *ſquamous*, or compoſed of ſcales; in the aſphodel, it is a number of oblong ſolid bulbs, connected together; in the crocus and ſaffron there are two bulbs, one over the other; in the colchicum they are placed ſide by ſide.

The lily is deficient, however, in one of the conſtituent parts of a perfect flower, namely, the *calyx* which is that outer green part of the flower, uſually divided into five parts, or compoſed of five ſmall leaves, ſuſtaining and embracing the corolla at the bottom, and enveloping it entirely before it opens, as may be remarked in the roſe. The calyx which accompanies almoſt all other flowers, is wanting in the greater part of the liliaceous tribe; as the tulip, the hyacinth, the narciſſus, the tuberoſe, &c. and even in the onion, leek, garlic, &c. which are alſo liliaceous, though they appear very different at firſt ſight.

The Linnæan ſyſtem of claſſing plants, is founded upon the ſuppoſition, that vegetables propagate their ſpecies in the ſame manner as animals.

The *ſtamina* he conſiders as the male, or fœcundating part, and the *piſtil* as the female. In ſome ſpecies the male and female flowers are different, and in ſome, as the palm-tree, they grow upon different plants. But in the majority, the male and the female are found within the ſame *corolla*, and this large diviſion of vegetables he ſtyles *hermaphrodite* plants. It is of little conſequence to the botaniſt, who wiſhes only to become acquainted with the genus and character of a plant, whether this ſyſtem be philoſophically true or not; it is ſufficient that it has been found the moſt commodious method of claſſification hitherto invented. On theſe principles Linnæus has arranged all the known genera of plants in twenty-five claſſes, and theſe again are ſubdivided into orders. The genera are diſtinguiſhed by attending to the other parts of the fructification, as the calyx, corolla, pericarpium, &c. &c.

In the following table the claſſes are diſtinctly exhibited, with the orders into which each claſs is ſubdivided. In the botanical plates the claſſes are all expreſſed, and with each particular claſs ſome one of the orders, which will eaſily ſerve to give the reader an idea of the reſt.

TABLE of the CLASSES and ORDERS.

CLASSES.	ORDERS.
1. MONANDRIA	1. *Monogynia.* 2. *Digynia.*
2. DIANDRIA	1. *Monogynia.* 2. *Digynia.* 3. *Trigynia.*
3. TRIANDRIA	1. *Monogynia.* 2. *Digynia.* 3. *Trigynia.*
4. TETRANDRIA	1. *Monogynia.* 2. *Digynia.* 3. *Tetragynia.*
5. PENTANDRIA	1. *Monogynia.* 2. *Digynia.* 3. *Trigynia.* 4. *Tetragynia.* 5. *Pentagynia.* 6. *Polygynia.*
6. HEXANDRIA	1. *Monogynia.* 2. *Digynia.* 3. *Trigynia.* 4. *Tetragynia.* 5. *Polyginia.*
7. HEPTANDRIA	1. *Monogynia.* 2. *Digynia.* 3. *Tetragynia.* 4. *Heptagynia.*
8. OCTANDRIA	1. *Monogynia.* 2. *Digynia.* 3. *Trigynia.* 4. *Tetragynia.*
9. ENNEANDRIA	1. *Monogynia.* 2. *Trigynia.* 3. *Hexagynia.*
10. DECANDRIA	1. *Monogynia.* 2. *Digynia.* 3. *Trigynia.* 4. *Pentagynia.* 5. *Decagynia.*
11. DODECANDRIA	1. *Monogynia.* 2. *Digynia.* 3. *Trigynia.* 4. *Pentagynia.* 5. *Dodecagynia.*
12. ICOSANDRIA	1. *Monogynia.* 2. *Digynia.* 3. *Trigynia.* 4. *Pentagynia.* 5. *Polyginia.*
13. POLYANDRIA	1. *Monogynia.* 2. *Digynia.* 3. *Trigynia.* 4. *Tetragynia.* 5. *Pentagynia.* 6. *Hexagynia.* 7. *Polygynia.*
14. DIDYNAMIA	1. *Gymnoſpermia.* 2. *Angioſpermia.*
15. TETRADYNAMIA	1. *Siliculoſa.* 2. *Siliquoſa.*

16. Mo-

16. MONADELPHIA	1. *Triandria.* 2. *Pentandria.* 3. *Octandria.* 4. *Enneandria.* 5. *Decandria.* 6. *Endecandria.* 7. *Dodecandria.* 8. *Polyandria.*
17. DIADELPHIA	1. *Pentandria.* 2. *Hexandria.* 3. *Octandria.* 4. *Decandria.*
18. POLYADELPHIA	1. *Pentandria.* 2. *Icoſandria.* 3. *Polyandria.*
19. SYNGENESIA	1. *Polygamia æqualis.* 2. *Polygamia ſuperflua.* 3. *Polygamia fruſtranea.* 4. *Polygamia neceſſaria.* 5. *Polygamia ſegregata.* 6. *Monogamia.*
20. GYNANDRIA	1. *Diandria.* 2. *Triandria.* 3. *Tetrandria.* 4. *Pentandria.* 5. *Hexandria.* 6. *Decandria.* 7. *Dodecandria.* 8. *Polyandria.*
21. MONOECIA	1. *Monandria.* 2. *Diandria.* 3. *Triandria.* 4. *Tetrandria.* 5. *Pentandria.* 6. *Hexandria.* 7. *Heptandria.* 8. *Polyandria.* 9. *Monadelphia.* 10. *Syngeneſia.* 11. *Gynandria.*
22. DIOECIA	1. *Monandria.* 2. *Diandria.* 3. *Triandria.* 4. *Tetrandria.* 5. *Pentandria.* 6. *Hexandria.* 7. *Octandria.* 8. *Enneandria.* 9. *Decandria.* 10. *Dodecandria.* 11. *Polyandria.* 12. *Monadelphia.* 13. *Syngeneſia.* 14. *Gynandria.*
23. POLYGAMIA	1. *Monoecia.* 2. *Dioecia.* 3. *Trioecia.*
24. CRYPTOGAMIA	1. *Filices.* 2. *Muſci.* 3. *Algæ.* 4. *Fungi.*
25.	1. *Palmæ.*

Explanation of the Botanical Plates.

FIG. I. Illuſtrates the Claſs *Monandria*, and Order *Monogynia*, (one Stamen and one Piſtil) as in the *Canna Indica*, Indian Flowering reed.

II. *Monandria Monogynia*, two Stamens and one Piſtil, as in Veronica, or Speedwell.

III. *Triandria Digynia*, three Stamens and two Stigmata, as in the Graſſes, &c.

IV. *Tetrandria Monogynia*, four Stamnes and one Piſtil, as in many examples.

V. *Pentandria Monogynia*, five Stamens and one Style or Piſtil, as in the Hen-bane, &c.

VI. *Hexandria Monogynia*, ſix Stamens and one Style, as in Tradeſcantia Virginia, Spider-wort, &c.

VII. *Heptandria Monogynia*, ſeven Stamens and one Style.

VIII. *Octandria Monogynia*, eight Stamens and one Style, as in Erica, Heath, &c.

IX. *Enneandria Monogynia*, nine Stamens, &c.

X. *Decandria Pentagynia*, ten Stamens and five Styles, as in Sedum, &c.

XI. *Dodecandria Monogynia*, twelve Stamens and one Piſtil.

XII. *Icoſandria Polygynia*, twenty Stamens ariſing from the ſubſtance of the Calyx or Corolla, with many Stigmata, as in *Geum*, *Water Avens*, &c.

XIII. *Polyandria Monogynia*, many Stamens with one Piſtil or Style, as in *Ciſtus*, Poppy, &c.

XIV. *Didynamia*, two Stamens longer than the other two, as in *Lanuum*, Arch-angel, &c.

XV. *Tetradynamia*, ——— ſix Stamens, four longer than the other two.

XVI. *Monadelphia Pentagynia*, many Stamens united at the baſe, and forming a cylinder with five Stigmata, as in *Hibiſcus Syriacus*, in the Mallow, &c.

XVII. *Diadelphia*,——— the Stamens in two parcels, as in the Pea, &c.

XVIII. *Polyadelphia*, ——— many ſets of Stamens in one Flower.

XIX. *Sygeneſia*,——— Anthers united, as in *Aſter*, *Violet*, &c.

XX.

Plate 106.

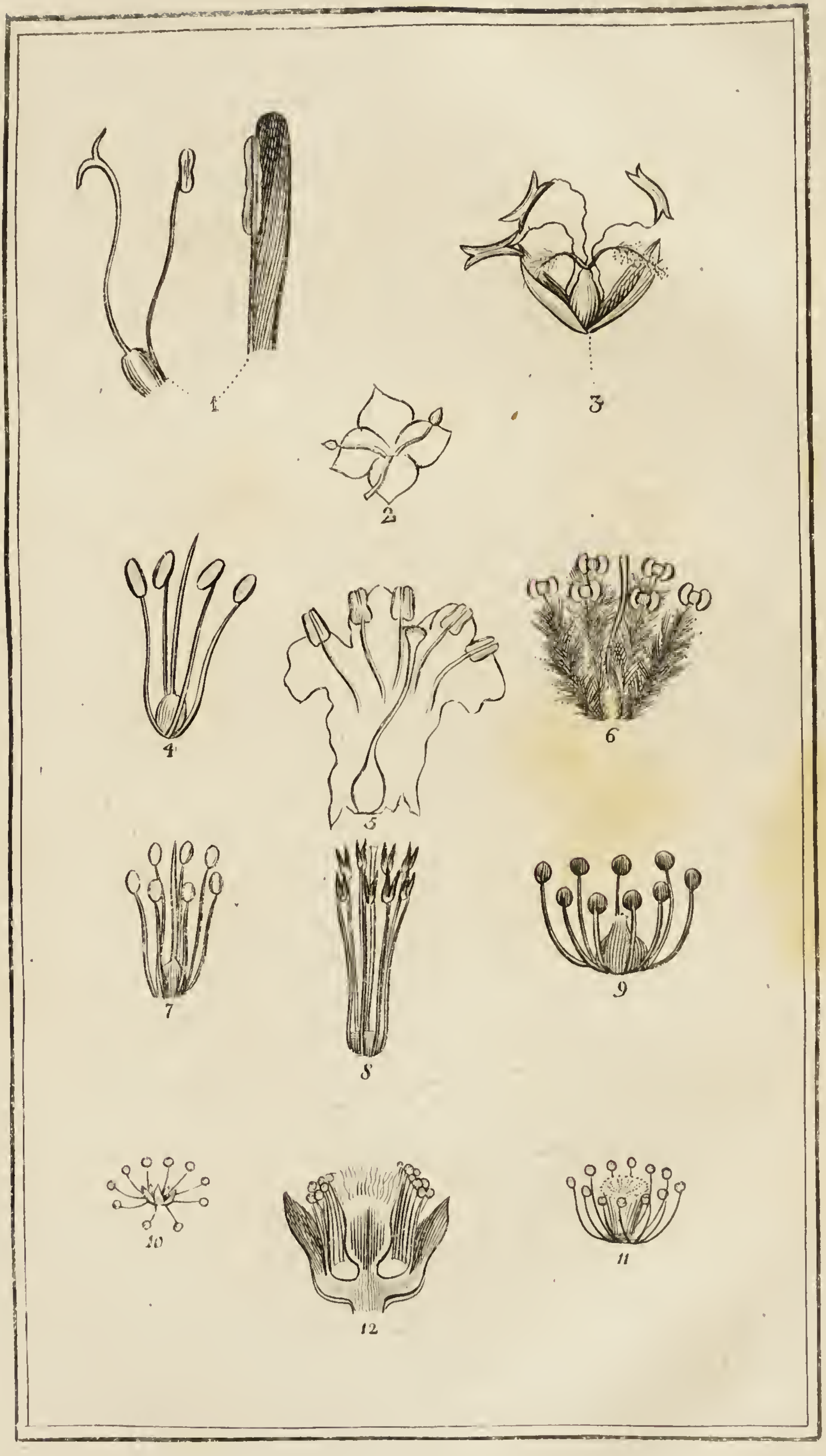
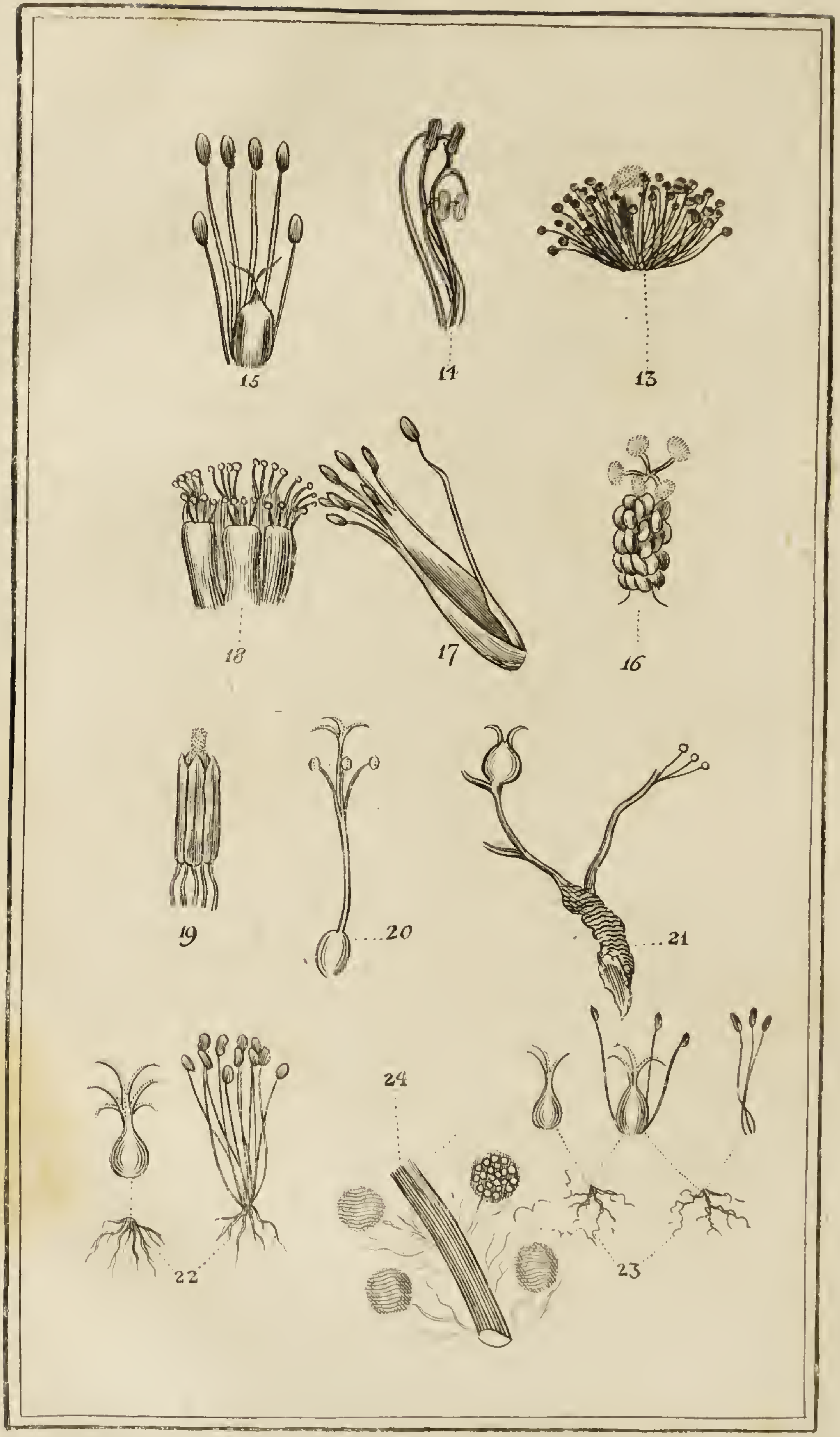


Plate 107.



XX. *Gynandria*, ——Stamens connected to the Style, as in *Siſyrinchium*, &c.

XXI. *Monoecia*,——— male and female flowers ſeparate, but on the ſame plant.

XXII. *Dioecia* —— Plants of this Claſs are either male or female, each diſtinct, and bearing from a ſeparate root.

XXIII. *Polygamia*.——— Plants of this Claſs bear *Hermaphrodite*, together with diſtinct male and female flowers, or both.

XXIV. *Cryptogamia*.——— Plants of this kind have a concealed fructification, as in the *Felices*, Ferns, &c.

EXPLANATION *of the* ORDERS.

CLASS I. MONANDRIA. 2. DIANDRIA. 3. TRIANDRIA. 4. TETRANDRIA. 5. PENTANDRIA. 6. HEXANDRIA. 7. HEPTANDRIA. 8. OCTANDRIA. 9. ENNEANDRIA. 10. DECANDRIA.—Theſe ten Claſſes, which conſiſt of Hermaphrodite Flowers, take their Denominations from the Number of Stamina, or male Parts of the Flower. The Word here compounded with the numerical Terms, ſignifies *a Huſband*; ſo that the Title *Monandria* expreſſes, that the Flowers of this Claſs have but *one* Huſband, that is, one Stamen; *Diandria*, *two* Stamina; *Triandria*, *three*; *Tetrandria*, *four*; *Pentandria*, *five*; *Hexandria*, *ſix*; *Heptandria*, *ſeven*; *Octandria*, *eight*; *Enneandria*, *nine*; and *Decandria*, *ten*. It muſt be obſerved however, that the Flowers being Hermaphrodite, as above mentioned, is in all theſe Claſſes a neceſſary Condition; for ſhould the female Part be wanting, the Plant would belong to ſome other Claſs, notwithſtanding the Number of Stamina may be ſuch as would otherwiſe refer it to one of theſe: And this Caution we give once for all, to avoid Repetitions, that when we uſe the Term *Hermaphrodite*, we mean that it is a Condition not to be diſpenſed with.

CLASS XI. DODECANDRIA.—This Term in the *Greek* imports that the Flowers have *twelve* Huſbands or Stamina. However, the Claſs is not confined to this Number, but includes all ſuch Hermaphrodite Flowers as are furniſhed with any Number of Stamina from *twelve* to *nineteen* incluſive; No Flowers have been yet found to have eleven Stamina, which is the Reaſon no Claſs has been allotted to that Number.

CLASS XII. ICOSANDRIA.—This Term imports, that the Flowers have *twenty* Huſbands or Stamina: But here again the Title is to be underſtood with great Latitude; for though the Plants that belong to this Claſs are rarely found with leſs than twenty Stamina, yet they frequently have a greater Number; and they are therefore not to be known with Certainty from thoſe of the next Claſs, without having Recourſe to their claſſic Character; which, not being expreſſed in the Title, we forbear the Explanation of here, as we ſhall give it in the Section allotted for this Claſs.

CLASS XIII. POLYANDRIA.—This Term imports, that the Flowers have *many* Stamina.

CLASS XIV. DIDYNAMIA.—This Term ſignifies the *Power* or *Superiority* of *two*, and is applied to this Claſs, becauſe its Flowers have four Stamina, of which there are two longer than the reſt: This circumſtance alone is ſufficient to diſtinguiſh this Claſs from the fourth, where the four Stamina are equal; but the Flowers of this Claſs have alſo their particular Character, beſides what the Title expreſſes, their Corollæ being moſtly *Ringent*, as will be ſhewn in its Place.

CLASS XV. TETRADYNAMIA.—This Term expreſſes the Power or Superiority of *four*; and accordingly there are in the Flowers of this Claſs ſix Stamina, four of which are longer than the reſt; which Circumſtance diſtinguiſhes them from thoſe of the ſixth Claſs, where the ſix Stamina are equal: But theſe Flowers have their particular Character alſo, their Corollæ being *Cruciform*.

CLASS XVI. MONADELPHIA.—The Word here, compounded with the numerical Term, ſignifies a *Brother*. This Relation is employed to expreſs the Union of the Filaments of the Stamina, which in this Claſs do not ſtand ſeparate, but join at the Baſe, and form one Subſtance, out of which they proceed as from a common Mother; and the Title of the Claſs expreſſes a *ſingle* Brotherhood, meaning that there is but *one* Set of Stamina ſo united, which diſtinguiſhes the Claſs from the two following ones. The Number of Stamina in this Claſs is not limited: The Flowers have their particular Character.

CLASS XVII. DIADELPHIA.—This Term expreſſes a *double* Brotherhood, or *two* Sets of Stamina, united in the manner explained in the preceding Claſs. The Number of the Stamina is not limited: The Flowers of this Claſs have a very particular Character, their Corolla being *Papilionaceous*, as will be ſhewn in its Place.

CLASS XVIII. POLYADELPHIA.—This Term expreſſes *many* Brotherhoods, or Sets of Stamina; the Flowers have no claſſic Character, farther than is expreſſed in the Title.

CLASS XIX. SYNGENESIA.—This Claſs contains the compound Flowers deſcribed in Part I. Chap. 19. The Title ſignifies *Congeneration*, alluding to the Circumſtance of the Stamina; in which, though the Filaments ſtand ſeparate, yet the Antheræ, which are the Part more immediately ſubſervient to Generation, are united in a Cylinder, and perform their Office *together*. The claſſic Character will be explained in its Place.

CLASS XX. GYNANDRIA.—The Term is compounded of two Words, that ſignify *Wife* and *Huſband*; and alludes to the ſingular Circumſtance of this Claſs, in the Flowers of which the Stamina grow upon the Piſtillum; ſo that the male and female Parts are united, and do not ſtand ſeparate, as in other Hermaphrodite Flowers.

CLASS XXI. MONOECIA.—The Word here, compounded with the numerical Term, ſignifies a *houſe* or *habitation*. To underſtand the Application of this Title, we muſt know, that the Plants of this Claſs are not *Hermaphrodite* but *Androgynous*, the Flowers that have the Stamina wanting the Piſtillum, and thoſe that have the Piſtillum wanting the Stamina. Now the Term *Monoecia*, which ſignifies a *ſingle* Houſe, alludes to this Circumſtance; that in this Claſs the male and female Flowers are both found on the *ſame* Plant, whereas in the next they have *diſtinct* Habitations.

CLASS XXII. DIOECIA.—This Term, which ſignifies *two* Houſes, is applied to this Claſs (the Plants of which are *Male* and *Female*) to expreſs the Circumſtance of the *male* Flowers being on one Plant, and the *female* on another; the contrary of which is the Caſe of the Androgynous Claſs *Monoecia*, laſt explained.

CLASS XXIII. POLYGAMIA.—The Term ſignifies *Plurality* of *Marriages*. This Claſs produces, either upon the ſame or different Plants, *Hermaphrodite* Flowers, and alſo Flowers of *one* Sex only, be it male or female; or Flowers of *each* Sex; and the latter receiving Impregnation from, or giving it to the Hermaphrodites, as their Sex happens to be, the Parts eſſential to Generation in the Hermaphrodite Flowers do not confine themſelves to the correſponding Parts within the ſame Flower, but become of *promiſcuous* Uſe; which is the Reaſon of giving this Title to the Claſs.

CLASS XXIV. CRYPTOGAMIA.—The Term ſignifies *Concealment* of *Marriages*; this Claſs conſiſting of ſuch Plants as either bear their Flowers concealed within the Fruit, or have them ſo ſmall, as to be imperceptible.

CLASS XXV. *Palmæ*, Palms.

Explanation of the TITLES *of the* ORDERS.

The Titles of the Orders have been already given. It remains therefore to explain them.

CLASS I. to XIII. incluſive.—The Orders of the firſt thirteen Claſſes take their Denominations from the Number of the *Piſtillum*, or Female Part of the Plant, which is uſually reckoned from the *Baſe* of the *Style*, if there be any; but if the Style be wanting, the Number is fixt from the *Stigmata*. The *Greek* Word, compounded with the numerical Terms in the Titles of theſe Orders, ſignifies a *Wife*: *Monogynia* implies *one Wife* or one Style; *Digynia*, *two* Styles; *Trigynia three*; *Tetragynia*, *four*; *Pentagynia*, *five*; *Hexagynia*, *ſix*; *Decagynia*, *ten*; and *Polygynia*, *many*. Theſe are the Titles that occur in the Orders of theſe thirten Claſſes; and this general Explanation of them will be thought ſufficient, as from the Table it appears howthey are employed in the Claſſes.

CLASS XIV. DIDYNAMIA.—Of the three Orders of this Claſs the two firſt are founded on a Diſtinction in the Fruit. The Title of the firſt Order, *Gymnoſpermia*, is expreſſive of ſuch Plants as have *naked* Seeds; and that of the ſecond, *Angioſpermia*, of ſuch as have their Seeds in a *Veſſel* or *Pericarpium*. The third Order, *Polypetala*, is expreſſive of ſuch Plants as have *many Petals*: This Order ſeems to have been eſtabliſhed in Favour of one Genus of Plants only, the *Melianthus*, the Flowers of which are *Polypetalous*, though thoſe of all the reſt of this Claſs are *Monopetalous*.

CLASS XV. TETRADYNAMIA.—The two orders of this claſs are founded on a diſtinction in the *Pericarpium*. In the firſt order, *Siliculoſa*, the *Pericarpium* is a *Silicula*, *little pod*; which differs from the *Siliqua* or *pod* in being round, and having the apex of the diſſepiment, which had been the ſtyle, prominent beyond the valves, often ſo far as to be equal in length to the Silicula. In the ſecond order, *Siliquoſa*, the pericarpium is a *Siliqua*, which is long and without any remarkable extenſion of the ſtyle.

CLASS XVI. MONADELPHIA. XVII. DIADELPHIA. XVIII. POLYADELPHIA.—The orders of theſe three claſſes are founded on the number of the ſtamina in each brotherhood or diſtinct ſet of ſtamina. The titles of the orders being the ſame that are uſed for the titles of the early claſſes of the ſyſtem, the explanation need not be repeated here.

CLASS XIX. SYNGENESIA.—To underſtand the orders of this claſs, we muſt explain what is meant by *Polygamy* in Flowers. We have already treated of polygamous *Plants*, and ſhewn that the term *Polygamous*, as there applied, alluded to the intercommunication of the male or female flowers with the Hermaphrodite ones, either upon the ſame or a diſtinct plant: But in reſpect to flowers, the term is applied to a ſingle flower only; for the flowers of this claſs being compound, a polygamy ariſes from the intercommunication of the ſeveral florets in one and the ſame flower. Now the *Polygamy* of *Flowers*, in this ſenſe of the word, affords four caſes, which are the foundations of the four firſt orders of this claſs. 1ſt Order, *Polygamia æqualis*, *equal Polygamy*, is when *all* the florets are *Hermaphrodite*. 2d Order, *Polygamia ſuperflua*, *ſuperfluous Polygamy*, when *ſome* of the florets are *Hermaphrodite*, and *others female* only; for in this Caſe, as the fructification is perfected in the Hermaphrodites, the addition of the females is a ſuperfluity. 3d Order, *Polygamia fruſtranea*, *fruſtraneous* or *ineffectual Polygamy*, when ſome of the florets are *Hermaphrodite*, and others *Neuter*; for in this caſe the addition of the Neuters is of no aſſiſtance to the fructification. 4th Order, *Polygamia neceſſaria*, *neceſſary Polygamy*, when ſome of the florets are *male*, and the reſt *female*; for in this caſe there being no Hermaphrodites, the polygamy ariſing from the compoſition of the florets of different ſexes is *neceſſary* to perfect the fructification. 5th Order, *Polygamia ſegregata*. The title ſignifies to be ſeparated, the plants of this order having partial cups growing out of the common calyx which ſurround and divide the floſculi or florets. 6th Order, *Monogamia*: The title ſignifies a *ſingle* marriage, and is oppoſed to the *Polygamia* of the four other orders; for in this, though the antheræ are united, which is the eſſential character of the flowers of this claſs, the flower is *ſimple*, and not compounded of *many* florets, as in the other orders.

CLASS XX. GYNANDRIA.—The orders of this claſs are founded on the number of ſtamina. The titles have been already explained.

CLASS XXI. MONOECIA. XXII. DIOECIA.—Theſe two claſſes, whoſe flowers have no fixt character but that of not being Hermaphrodite, take in the characters of almoſt every other claſs; and the orders have accordingly been diſpoſed under the titles of thoſe claſſes, to which their reſpective flowers would have belonged, if the ſtamina and piſtillum had been under the ſame covers: As the explanation of all theſe titles has been given in the laſt chapter in the explanation of the claſſes, it need not be repeated here.

CLASS XXIII. POLYGAMIA.—In this claſs the titles of the two firſt orders are the ſame with the titles of the twenty-firſt and twenty-ſecond claſſes, and are to be underſtood in the ſame manner; that is, 1. *Monoecia*, when the polygamy is on the *ſame* plant: and, 2. *Dioecia*, when it is on *diſtinct* plants. The order *Trioecia* has been eſtabliſhed in favour of a ſingle genus, the *Ficus*; in which the polygamy is on *three* diſtinct plants, one producing *male* flowers, another *female*, and a third *Hermaphrodite*, or *Androginous.*

CLASS XXIV. CRYPTOGAMIA.—The orders of this claſs are, 1. *Filices*, *Ferns*, 2. *Muſci*, *Moſſes*. 3. *Algæ*, *Flags*; and 4. *Fungi*, *Muſhrooms*. The explanation of the character of which will follow when we treat of the genera.

The Genera of the Plants arranged according to the Claſſes and Orders.

Of the 1ſt CLASS, MONANDRIA. This claſs conſiſts of ſuch plants as bear *Hermaphrodite* flowers, furniſhed with but *one* ſtamen. The orders are *two*, viz.

ORDER I. MONOGYNIA, comprehending ſuch plants as have but *one* ſtyle. This order contains fourteen genera, diſtinguiſhed into, 1. Trilocular, ſuch as have the Pericarpium divided into three Loculaments: of which there are eleven, viz. *Canna*, Indian flowering-reed, *Amomum*, Ginger, *Coſtus*, *Alpinia*, *Maranta*, Indian arrow-root. *Curcuma*, Turmerick, *Kæmpferia*, *Thalia*, *Myroſma*, *Phyllachne*, and *Renealmia*. 2. Monoſpermous, ſuch as have a ſingle ſeed, of which there are three, viz. *Boerhaavia*, American hog-weed, *Salicornia*, Jointed glaſs-wort, and *Hippuris*.

ORDER II. DYGINIA, comprehending ſuch plants as have two ſtyles. This order contains five genera, viz. *Coriſpermum*, Tick-ſeed, *Callitriche*, Star-headed water chick-weed, *Blitum*, Strawberry Spinach or Blite, *Cinna*, and *Mniarum*.

Of the 3d CLASS, DIANDRIA. This claſs conſiſts of ſuch plants as bear *Hermaphrodite* flowers, furniſhed with *two* ſtamina. The orders are three, viz.

ORDER I. MONOGYNIA, comprehending ſuch plants as have but *one* ſtyle. This order contains thirty-one genera, diſtinguiſhed into, 1. Such has have *regular* corollæ, of which there are eleven, viz. *Nyctanthes*, Arabian Jaſmin, *Jaſminum*, Jaſmin, *Liguſtrum*, Privet, *Phillyrea*, Mock privet, *Olea*, Olive, *Chionanthus*, Snow-drop tree, or Fringe tree, *Syringa*, Lilach, *Dialium*, *Eranthemum*, *Circæa*, Enchanters Night-ſhade, and *Wulfenia*. 2. Such as have irregular corollæ, and the fruit Angioſpermous ‡; of which there are ten, viz. *Veronica*, Speedwell, *Pæderota*, *Juſticia*, Malabar Nut, *Dianthera*, *Gratiola*, Hedge Hyſſop, *Schwenkia*, *Pinguicula*, Butter-wort, *Utricularia*, Water-milfoil, *Calceolaria*, and *Globba*. 3. Such as have irregular corolla, and the fruit *Gymnoſpermous* §; of which there are twelve, viz. *Verbena*, Vervain, *Lycopus*, Water horehound, *Amethyſtea*, *Cunila*, *Ziziphora*, Syrian field-baſil, *Monarda*, Oſwego tea, *Roſmarinus*, Roſemary, *Salvia*, Sage, *Collinſonia*, *Morina*, *Anciſtrum*, and *Thouinia*.

ORDER II. DYGINIA, comprehending ſuch plants as have *two* ſtyles. This order contains but one genus, viz. *Anthoxanthum*, Vernal graſs.

ORDER III. TRYGINIA, comprehending ſuch plants as have *three* ſtyles. There is but one genus of this order, viz. *Piper*, Pepper.

Of the 3d CLASS, TRIANDRIA. This claſs conſiſts of ſuch plants as bear Hermaphrodite flowers, furniſhed with three ſtamina. The orders are three, viz.

ORDER I. MONOGYNIA, comprehending ſuch plants as have but *one* ſtyle. This order contains thirty-four genera, diſtinguiſhed into, 1. Thoſe whoſe flowers have no ſpatha or amentum; of which there are ſixteen, viz. *Valeriana*, Valerian, *Olax*, *Willichia*, *Tamarindus*, Tamarind tree, *Rumphia*, *Cneorum*, Widow Wail, *Camocladia*, *Melotheria*, Small creeping Cucumber, *Ortegia*, *Loeflingia*, *Polycnemum*, *Hippocratea*, *Rotala*, *Witſenia*, *Pommereulla*, and *Dilatris*. Such as have ſpathaceous flowers, and a trilocular capſule; of which there are ten, viz. *Crocus*, Saffron, *Ixia*, *Gladiolus*, Corn Flag, *Antholyza*, *Iris*, Flower de Luce, *Moræa*, *Wachendorſia*, *Commelina*, *Calliſia*, and *Xyris*. 3. Such as have an imbricated amentum, and are gymnoſpermous *; of which there are eight, viz. *Schoenus*, Baſtard Cypreſs, *Cyperus*, Engliſh Galingale, *Scirpus*, Ruſh-graſs, *Eriophorum*, *Lygeum*, Hooded Mat-weed, *Nardus*, *Kyllinga*, and *Fuirena*.

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‡ The ſeeds in a veſſel. See the table explanatory of botanical terms, at the end of this claſs.

§ The ſeeds naked.

ORDER II. DIGYNIA, comprehending ſuch plants as have *two* ſtyles. This order contains thirty-one genera †, viz. *Bobartia*, *Cornucopia*, *Saccharum*, Sugar-cane, *Panicum*, Panic graſs, *Phleum*, Cat's tail Graſs, *Alopecurus*, Fox tail Graſs, *Milium*, Millet, *Agroſtis*, Bent Graſs, *Aira*, Hair Graſs, *Melica*, *Poa*, *Briza*, Quaking Graſs, *Uniola*, Sea-ſide Oats of Carolina, *Dactylis*, Cock's-foot Graſs, *Cynoſurus*, Dog's-tail Graſs, *Feſtuca*, Feſcue Graſs, *Bromus*, Brome Graſs, *Stipa*, Feather graſs, *Avena*, Oats, *Lagurus*, Hare's-tail Graſs, *Arundo*, Reed, *Ariſtida*, *Lolium*, Darnel or Rye Graſs, *Elymus*, *Secale*, Rye, *Hordeum*, Barley, *Triticum*, Wheat, *Phalaris*, Canary Graſs, *Paſpalum*, *Rottboella*, and *Anthiſtiria*.

ORDER III. TRIGYNIA, comprehending ſuch plants as have *three* ſtyles. This order contains eleven genera, viz. *Eriocaulon*, *Montia*, Blinks, *Proſerpinaca*, *Triplaris*, *Holoſteum*, *Polycarpon*, *Mollugo*, *Minuartia*, *Queria*, *Lechea*, and *Koenigia*.

Of the fourth Claſs, TETRANDRIA. This claſs conſiſts of ſuch plants as bear *Hermaphrodite* flowers, furniſhed with *four* ſtamina. The flowers of this claſs, may be known from thoſe of the fourteenth by this diſtinction, that the ſtamina are of an equal length; whereas in thoſe of the fourteenth, which have four ſtamina likewiſe, there are two long and two ſhort. The orders of this claſs are *three*, viz.

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* The ſeeds ſingle and naked.

† All the plants of this order are graſſes, the leaves of which are food for cattle, the ſmall ſeeds for birds, and the larger grain for man.

ORDER I. MONOGYNIA, comprehending ſuch plants as have but *one* ſtyle. This order contains ſeventy genera, diſtinguiſhed into, 1. Such as have *aggregate* flowers properly ſo called, with the ſeeds ſingle and naked; of which there are ſeven, viz. *Protea*, Silver Tree, *Cephalanthus*, Button Wood, *Globularia*, Blue Daiſy, *Dipſacus*, Teazel, *Knautia*, *Scabioſa*, Scabious, and *Allionia*. 2. Such as have their flowers *monopetalous* on a double fruit, and the *ſtyle* bifid, of which there are twenty*, viz. *Hedyotis*, *Spermacoce*, Button Weed, *Sherardia*, Little Field Madder, *Aſperula*, Woodroof, *Diodia*, *Knoxia*, *Manettia*, *Houſtonia*, *Galium*, Lady's bed ſtraw; *Crucianella*, Petty Madder, *Rubia*, Madder, *Scabrita*, *Embothrium*, *Hydrophylax*, *Hartogia*, *Acaena*, *Banckſia*, *Orixa*, *Othera*, and *Skimmia*. 3. Such as have *monopetalous* flowers otherways circumſtanced; of which there are twenty, viz. *Siphonanthus*, *Cateſbæa*, Lily Thorn, *Ixora*, *Pavetta*, *Peteſia*, *Mitchella*, *Callicarpa*, Johnſonia, *Aquartia*, *Polypremum*, Carolina Flax, *Penæa*, *Blaeria*, *Buddleja*, *Exacum*, *Plantago*, Plantain, *Scoparia*, *Rhacoma*, *Centunculus*, *Sanguiſorba*, Greater wild Burnet, *Ciſſus*, and *Ægiphila*. 4. Such as are tetrapetalous and complete †: of which there are twelve, viz. *Epimedium*, Barren Wort, *Cornus*, Dogwood or Cornelian Cherry, *Fagara*, *Tomex*, *Amannia*, *Ptelea*, Shrub Trefoil, *Ludwigia*, *Oldenlandia*, *Iſnardia*, *Santalum*, Saunders, *Trapa*, Water Caltrops, and *Samara*. 5. Such as are incomplete ‡; of which there are eleven, viz. *Dorſtenia*, Contrayerva, *Elæagnus*, Wild Olive, *Crameria*, *Rivina*, *Salvadora*, *Camphoroſma*, *Alchemilla*, Ladies Mantle, *Struthiola*, *Cometes*, and *Sirium*.

ORDER II. DIGYNIA, comprehending ſuch plants as have *two* ſtyles. This order contains nine genera, viz. *Aphanes*, Parſley Piert, *Cruzita*, *Bufonia*, *Hamamelis*, Witch Hazel, *Cuſcuta*, Dodder, *Hypecoum*, *Galopina*, *Gomozia*, and *Gonocarpus*.

ORDER III. TETRAGYNIA, comprehending ſuch plants as have *four* ſtyles. This order contains ſeven genera, viz. *Ilex*, Holly, *Coldenia*, *Potamogiton*, Pond Weed, *Ruppia*, *Sagina*, Purl-wort, *Myginda*, and *Tillæa*.

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* These are the Stellatæ, Starry Plants, of *Ray*. They are held to be aſtringent and diuretic.

† Not wanting either calyx or corolla.

‡ Calyx or corolla wanting.

Of the fifth Claſs, PENTANDRIA. This claſs conſiſts of ſuch plants as bear *Hermaphrodite* flowers, furniſhed with *five* ſtamina. The orders are ſix, viz.

ORDER I. MONOGYNIA, comprehending ſuch plants as have but *one* ſtyle[*]. This order contains one hundred and fifty-five genera, diſtinguiſhed into, 1. *Monopetalous Tetraſpermous*[†], of which there are ſixteen[‡], viz. *Heliotropium*, Turn-ſole, *Myoſotis*, Mouſe-ear Scorpion Graſs, *Lithoſpermum*, Gromwell, *Anchuſa*, Bugloſs, *Cynogloſſum*, Hound's-tongue, *Pulmonaria*, Lungwort, *Symphytum*, Comphrey, *Onoſma*, *Cerinthe*, Honey-wort, *Borago*, Borrage, *Aſperugo*, Wild bugloſs or gooſe graſs, *Lycopſis*, *Echium*, Viper's Bugloſs, *Nolana*, *Tournefortia*, and *Meſſerſchmidia*. 2. *Monopetalous* with the *Capſule* within the flower; of which there are thirty-five, viz. *Diapenſia*, *Aretia*, *Androſace*, *Primula*, Primroſe, *Cortuſa*, Bear's-ear Sanicle, *Porana*, *Soldanella*, Soldanel, *Dodecatheon*, Meadia, *Cyclamen*, Sow-bread, *Menyanthes*, Bog-bean, or marſh Trefoil, *Hottonea*, Water Milfoil, or Water Violet, *Hydrophyllum*, Water-leaf, *Lyſimachia*, Looſeſtrife, *Anagillis*, Pimpernel, *Theophraſta*, *Patagonula*, *Spigelia*, Worm-graſs, *Ophiorrhiza*, Serpent's Tongue, *Randia*, *Azalea*, American Upright Honey-ſuckle, *Plumbago*, Lead-wort, *Phlox*, Lichnidea, or Baſtard Lychnis, *Convolvulus*, Bind-weed, *Ipomea*, Quamoclit, *Liſianthus*, *Broſſæa*, *Allamanda*, *Polemonium*, Greek Valerian, *Nigrina*, *Retzia*, *Scheffieldia*, *Epacris*, *Doraena*, *Weigela*, *Tectona*, and *Ignatia*. 3. Monopetalous with the Germen below the flower; of which there are thirty-one, viz. *Campanula*, Bell-flower, *Roella*, *Phyteuma*, Rampions, *Trachelium*, Umbelliferous Throat-wort, *Samolus*, Round leaved Water Pimpernel, *Nauclea*, *Rondeletia*, *Macrocnemum*, *Bellonia*, *Portlandia*, *Cinchona*, *Pſychotria*, *Coffea*, Coffee-tree, *Chiococca*, *Ceropegia*, *Lonicera*, Honey-ſuckle, *Trioſteum*, Fever-root, or falſe Ipecacuana, *Morinda*, *Conocarpus*, Button-tree, *Hamellia*, *Erithalis*, *Menais*, *Genipa*, *Matthiola*, *Scævola*, *Muſſæenda*, *Virecta*, *Eſcallonia*, *Caroxylon*, *Elaedendrum*, and *Hovenia*. 4. Such as have declining ſtamina; of which there are ſeven, viz, *Mirabilis*, Marvel of Peru, *Coris*, Heathlow Pine, *Verbaſcum*, Mullein, *Datura*, Thorn Apple, *Hyocyamus*, Henbane, *Nicotiana*. Tobacco, and *Atropa*, Deadly Nightſhade. 5. Monopetalous, with a berry above the receptacle; of which there are twenty-two, viz. *Phyſalis*, Alkakingi, or Winter Cherry, *Solanum*, Nightſhade, *Capſicum*, Guinea Pepper, *Strychnus*, *Jacquinia*, *Chironia*, *Brunsfelſia*, *Cordia*, Sibeſtan, *Pergularia*, *Ceſtrum*, Baſtard Jaſmin, *Ehretia*, *Varronia*, *Laugieria*, *Lycium*, Box-thorn, *Chryſophyllum*, Star-apple, *Sideroxylum*, Iron-wood, *Rhamnus*, Buckthorn, *Arduina*, Baſtard Lycium, *Elliſia*, *Phylica*, Baſtard Alaternus, *Bladhia*, and *Fragraea*. 6. Polypetalous, of which there are thirty-one, viz. *Ceanothus*, New Jerſey Tea, *Byttneria*, *Myrſine*, African Box-tree, *Celaſtrus*, Staff-tree, *Euonymus*, Spindle-tree, *Dioſma*, African Spirea, *Brunia*, *Itea*, *Galax*, *Cedrela*, *Mangifera*, Mango-tree, *Hirtella*, *Ribes*, Currant-tree, *Gronovia*, *Hedera*, Ivy, *Vitis*, Vine, *Lagoecia*, Baſtard Cumin, *Sauvageſia*, *Claytonia*, *Achyranthes*, *Roridula*, *Kunhia*, *Plectronia*, *Cyrilla*, *Aquilicia*, *Heliconia*, *Cariſſa*, *Celoſia*, Cocks-comb, *Calodendrum*, *Chenolea*, and *Corynocarpus*. 7. *Incomplete* flowers, of which there are three, viz. *Illecebrum*, Mountain Knot-graſs, *Glaux*, Sea Milkwort, or black Saltwort, and *Theſium*, Baſtard Toad-flax. 8. Such as have the lobes of the Corollæ bent obliquely to the right: of which there are nine, viz. *Rauvolfia*, *Cerbera*, *Vinca*, Perriwinkle, *Gardenia*, Cape Jaſmin, *Nerium*, Oleander, or Roſe-bay, *Plumeria*, Red Jaſmin, *Echites*, *Cameraria*, and *Tabernamontana*.

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[*] The berries of the monopetalous plants of this order are for the moſt part poiſonous.

[†] With four Seeds.

[‡] Theſe are the Aſperifolia, rough-leaved plants of Ray's Hiſt. page 487. They are accounted glutinous and vulnerary.

ORDER II. DIGYNIA, comprehending ſuch plants as have two ſtyles. This order contains *ſeventy-five* genera, diſtinguiſhed into, 1. Such as have the *lobes* of the *Corollæ* bent *obliquely* to the right; of which there are ſix, viz. *Periploca*, Virginian Silk, *Cynanchum*, *Apocynum*, Dog's-bane, *Aſclepiis*, Swallow-wort, *Linconia*, and *Stapelia*. 2. Monoſpermous *; of which there are ten, vix. *Herniaria*, Rupture-wort, *Chenopodium*, Gooſe-foot, or Wild Orache, *Beta*, Beet, *Salſola*, Glaſs-wort, *Anabaſis*, Berry-bearing Glaſs-wort, *Creſſa*, *Gomphrena*, Globe-amaranth, *Steris*, *Boſea*, Yerva-mora, or Golden-rod Tree, and *Ulmus*, Elm-tree. 3. Polyſpermous †; of which there are thirteen, viz. *Nama*, *Hydrolea*, *Heuchera*, *Swertia*, Marſh Gentium, *Schrebera*, *Velezia*, *Gentiana*, Gentian, or Fell-wort, *Bu-*

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* Single-ſeeded. † Many-ſeeded.

malda, *Coproſma*, *Cuſſonia*, *Melondinus*, *Ruſſelia*, and *Vahlia*. 4. Gymnodiſpermous *, with a ſimple umbel; of which there are three †, viz. *Phyllis*, Baſtard Hare's-ear, *Eryngium*, Eryngo, or Sea Holly, and *Hydrocotyle*, Water Navelwort. 5. Gymnodiſpermous with an univerſal and partial *Involucrum*, of which there are twenty-ſeven, viz. *Sanicula*, Sanicle, *Aſtrantia*, Black Maſter-wort, *Bupleurum*, Hare's-ear, *Echinophora*, Prickly Parſnip, *Tordylium*, Hart-wort of Crete, *Caucalis*, Baſtard Parſley, *Artedia*, *Daucus*, Carrot, *Ammi*, Biſhop's-weed, *Bunium*, Pig-nut, or Earth-nut, *Conium*, Hemlock, *Selinum*, Milk Parſley, *Athamanta*, Spignel, *Peucedanum*, Hog's Fennel, or Sulphur-wort, *Crithmum*, Samphire, *Haſſelquiſtia*, *Cachrys*, *Ferula*, Fennel-giant, *Laſerpitium*, Laſer-wort, *Heracleum*, Cow Parſnip, *Liguſticum*, Lavage, *Angelica*, *Sium*, Water Parſnip, *Siſon*, Baſtard Stone-Parſley, *Bubon*, Macedonian Parſley, *Cuminum*, Cumin, and *Oenanthe*, Water Drop-wort. 6. Gymnodiſpermous with only one partial Umbel; of which there are eight, viz. *Phellandrium*, *Cicuta*, Water Hemlock, *Æthuſa*, Leſſer Hemlock, or Fool's Parſley, *Coriandrum*, Coriander, *Scandix*, Shepherd's needle, or Venus's Comb, *Chærophyllum*, Wild Chervil, *Imperatoria*, Maſter-wort, and *Seſeli*, Hartwort of Marſeilles. 7. Gymnodiſpermous without any involucrum, of which there are eight, viz. *Thapſia*, Deadly carrot, or Scorching Fennel, *Paſtinaca*, Parſnip, *Smyrnium*, Alexanders, *Anethum*, Dill, *Carum*, Carrui, or Carraway, *Pimpinella*, Burnet Saxifrage, *Apium*, Parſley, and *Ægopodium*, Herb Gerrard, Goutwort, or Wild Angelica.

ORDER III. TRIGYNIA, comprehending ſuch plants as have three ſtyles. This order contains ſeventeen genera, viz. *Rhus*, Sumach, *Viburnum*, Pliant Mealy-tree, or Wayfaring-tree, *Caſſine*; Hottentot cherry, *Sambucus*, Elder, *Spathelia*, *Staphylea*, Bladder-nut, *Tamarix*, Tamariſk, *Turnera*, *Telephium*, True Orpine, *Corrigiola*, *Pharnaceum*, *Alſine*, Chick-weed, *Drypis*, *Baſella*, Malabar Nightſhade, *Sarothra*, Baſtard Gentian, *Xylophylla*, and *Semecarpus*.

ORDER IV. TETRAGYNIA, comprehending ſuch plants as have four ſtyles. This order contains two genera, viz. *Parnaſſia*, Graſs of Parnaſſus, and *Evolvulus*.

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* Having two naked ſeeds.

† Theſe plants, and thoſe of the two diſtinctions next following, which are *Gymnodiſpermous* alſo, are the *umbellate* plants of *Tournefort's* ſeventh claſs. See his inſtitution, *R. H.* In dry ſoils they are aromatic, warm, reſolvent, and carminative, but in moiſt places poiſonous. The Virtue is in the roots and ſeeds.

ORDER V. PENTAGYNIA, comprehending ſuch plants as have five ſtyles. This order contains ten genera, viz. *Aralia*, Berry-bearing Angelicon, *Mahernia*, *Statice*, Thriſt, or Sea Pink, *Linum*, Flax, *Aldrovanda*, *Droſera*, Sun Dew, *Craſſula*, Leſſer Orpine, *Sibbaldia*, *Giſekia*, and *Commerſonia*.

ORDER VI. POLYGYNIA, comprehending ſuch plants as have many ſtyles. This order contains but one genus, viz. *Myoſurus*, Mouſe-tail.

Of the ſixth Claſs, HEXANDRIA.

This claſs conſiſts of ſuch plants as bear *Hermaphrodite* flowers, furniſhed with ſix ſtamina. The flowers of this claſs may be known from thoſe of the fifteenth by this diſtinction, that the ſtamina are of equal length, whereas in thoſe of the fifteenth which have ſix ſtamina likewiſe, there are four long and two ſhort. The orders of this claſs are five, viz.

ORDER I. MONOGYNIA, comprehending ſuch plants as have but one ſtyle. This order contains ſixty-two genera, diſtinguiſhed into 1. Such as have *trifid corollæ*, and a *calyx*, of which there are ſeven, viz. *Bromelia*, Ananas, or Pine-apple, *Tillandſia*, *Burmannia*, *Tradeſcantia*, Virginian Spider wort, *Burſera*, *Licuala*, and *Lachemalia*. 2. Such as have *monophyllous* ſpatha, of which there are nine, viz. *Pontederea*, *Hæmanthus*, Blood-flower, *Galanthus*, Snow Drop, *Leucojum*, Greater Snow Drop, *Tulbagia*, *Narciſſus*, Daffodil, *Pancratium*, Sea Daffodil, *Duroia* and *Nandina*. 3. Such as are *hexapetalous* and naked *; of which there are twenty-five, viz. *Crinum*, Aſphodel-lilly, *Amaryllis*, Lilly Daffodil, *Bulbocodium*, *Aphyllanthes*, *Allium*, Garlick, *Lilium*, Lilly, *Fritillaria*, Frittillary, *Uvularia*, *Glorioſa*, Superb Lilly, *Tulipa*, Tulip, *Erythronium*, Dog's-tooth Violet, *Albuca*, *Ornithogalum*, Star of Bethlem, *Scilla*, Squill, *Hypoxis*, *Cyanella*, *Aſphodelus*, Aſphodel, or King's Spear, *Anthericum*, Spider-wort, *Leontice*, Lion's Leaf, *Dracena*, *Aſparagus*, Aſparagus, or Sperage, *Ehrharta*, *Maſſonia*, *Phormium*, and *Pollia*. 4. Monopetalous and naked, of which there are ten, viz. *Convallaria*, Lilly of the Valley, *Polyanthes*, Tuberoſe, *Hyacinthus*, Hyacinth, *Aletris*, Baſtard Aloë, *Yucca*, Adam's Needle, *Aloe*, *Agave*, American Aloë,

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* Without a calyx. See the table at the end of this chapter, explanatory of the terms.

Alſtromeria, *Capura*, and *Hemerocallis*, Day-lilly, or Lilly-aſphodel. 5. Such as have a calyx, but the corollæ not trifid; of which there are thirteen, viz. *Acorus*, Sweet Ruſh, *Orontium*, Floating Arum, *Calamus*, *Juncus*, Ruſh, *Achras*, Sapota, *Richardia*, *Prinos*, Winter-berry, *Berberis*, Berberry, or Piperage Buſh, *Loranthus*, *Frankenia*, *Hillia*, *Peplis*, Water Purſlane, and *Canaria*.

ORDER II. DIGYNIA, comprehending ſuch plants as have two ſtyles. This order contains four genera, viz. *Atraphaxis*, *Oryza*, Rice, *Falkia*, and *Gahnia*.

ORDER III. TRIGYNIA, comprehending ſuch plants as have three ſtyles. This order contains ten Genera, viz. *Flagellaria*, *Rumex*, Dock, *Scheuchzeria*, Leſſer Flowering-ruſh, *Triglochin*, Arrow-headed Graſs, *Melanthium*, Climbing African Aſparagus, *Medeola*, *Trillium*, Herb True-love of Canada, *Colchicum*, Meadow Saffron, *Helonias*, and *Wurmbea*.

ORDER IV. TETRAGYNIA, comprehending ſuch plants as have four ſtyles. Of this order there is but one genus, viz. *Petiveria*, Guinea-hen Weed.

ORDER V. POLYGYNIA, comprehending ſuch plants as have many ſtyles. Of this order there is but one genus, viz. *Aliſma*, Water Plantain.

Of the ſeventh Claſs, HEPTANDRIA.

This claſs conſiſts of ſuch plants as bear *Hermaphrodite* flowers, furniſhed with ſeven ſtamina. The orders of this claſs are four, viz.

ORDER I. MONOGYNIA, comprehending ſuch plants as have but one ſtyle. This order contains three genera, viz. *Trientalis*, Winter Green with Chick-weed Flowers, *Diſandra*, and *Æſculus*, Horſe-cheſnut.

ORDER II. DIGYNIA, comprehending ſuch plants as have two ſtyles. This order contains but one genus, viz. *Limeum*.

ORDER III. TETRAGYNIA, comprehending ſuch plants as have four ſtyles. Of this order there are but two genera, viz. *Saururus*, Lizard's Tail, and *Aponogeton*.

ORDER IV. HEPTAGYNIA, containing ſuch plants as have ſeven ſtyles. Of this order there is but one genus, viz. *Septas*.

Of the eighth Claſs, OCTANDRIA.

This claſs conſiſts of ſuch plants as bear *Hermaphrodite* flowers, furniſhed with eight ſtamina. The orders are four, viz.

ORDER I. MONOGYNIA, comprehending ſuch plants as have but one ſtyle. Of this order there are thirty-one genera, viz. *Tropæolum*, Indian Creſs, *Oſbeckia*, *Rhexia*, *Oenothera*, Tree Primroſe, *Gaura*, Virginian Looſeſtrife, *Epilobium*, Willow Herb, or French Willow, *Melococca*, *Griſlea*, *Amyris*, *Allophylus*, *Combretum*, *Fuchſia*, *Ximenia*, *Mimuſops*, *Jambolifera*, *Memecylon*, *Lawſonia*, *Vaccinium*, Whortle-berry, *Erica*, Heath, *Daphne*, Mezereon, or Spurge-laurel, *Dirca*, Leather-wood, *Gnidia*, *Stellera*, German Groundſel, *Paſſerina*, Sparrow-wort, *Lachnæa*, *Antichorus*, *Chlora*, *Dodonæa*, *Ophira*, *Guarea*, and *Bæckea*.

ORDER II. DIGYNIA, comprehending ſuch plants as have two ſtyles. This order contains five genera, viz. *Galenia*, *Weinmannia*, *Moehringia*, Mountain Chick-weed, *Schmidelia*, and *Codia*.

ORDER III. TRIGYNIA, comprehending ſuch plants as have three ſtyles. This order contains five genera, viz. *Polygonum*, Knot Graſs, *Coccoloba*, *Paullinia*, *Cardioſpermum*, Heart Pea, and *Sapindus*, Soap-berry.

ORDER IV. TETRAGYNIA, comprehending ſuch plants as have four ſtyles. This order contains four genera, viz. *Paris*, Herb True-love, or Oneberry, *Adoxa*, Tuberous Moſchatel, or Hollow Root, *Elatine*, Water-wort, and *Haloragis*.

Of the ninth Claſs, ENNEANDRIA.

This claſs conſiſts of ſuch plants as bear *Hermaphrodite* flowers, furniſhed with nine ſtamina. The orders are three, viz.

ORDER I. MONOGYNIA, comprehending ſuch plants as have but one ſtyle. This order contains four genera, viz. *Laurus*, Bay, *Tinus*, *Anacardium*, Caſhew-nut, and *Caſſyta*.

ORDER II. TETRAGYNIA, comprehending ſuch plants as have three ſtyles. This order contains but one genus, viz. *Rheum*, Rhubarb.

ORDER III. HEXAGYNIA, comprehending ſuch plants as have ſix ſtyles. Of this order there is but one genus, viz. *Butomus*, Flowering Ruſh, or Water Gladiolus.

Of the tenth Claſs, DECANDRIA.

This claſs conſiſts of ſuch plants as bear *Hermaphrodite* flowers, furniſhed with ten ſtamina. The orders are five, viz.

ORDER I. MONOGYNIA, comprehending ſuch plants as have but one ſtyle. This order contains fifty-ſix genera, diſtinguiſhed into 1. Such as have declined ſtamina, of which there are fifteen, viz. *Sophora*, *Anagyris*, Stinking Bean Trefoil, *Cercis*, Judas Tree, *Bauhinia*, Mountain Ebony, *Parkinſonia*, *Hymenæa*, Locuſt-tree, or Courbaril, *Caſſia*, Wild Senna, *Poinciana*, Barbadoes Flower-fence, *Cæſalpinia*, Braſilletto, *Guilandina*, Bardue, or Nichar-tree, *Guaiacum*, Lignum Vitæ, *Cynometra*, *Anacardium*, Caſhew-nut, *Swietenia*, Mahogany Tree, and *Dictamnus*. 2. Such as have erect ſtamina, of which there are forty-one, viz. *Ruta*, Rue, *Toluifera*, Balſam of Tolu Tree, *Hæmatoxylum*, Log-wood, *Adenanthera*, Baſtard flower-fence, *Melia*, Bread-tree, *Trichilia*, *Zygophyllum*, Bean-caper, *Quaſſia*, *Fagonia*, *Tribulus*, Caltrops, *Thryallis*, *Murraya*, *Monotropa*, *Juſſieua*, *Limonia*, *Melaſtoma*, American Gooſe-berry, *Kalmia*, Dwarf American Laurel, *Ledum*, Marſh Ciſtus, or Wild Roſemary, *Quiſqualis*, *Dais*, *Bergera*, *Bucida*, *Copaifera*, *Samyda*, *Rhododendron*, Dwarf Roſe-bay, *Andromeda*, Marſh Ciſtus, *Epigæa*, Trailing Arbutus, *Gualtheria*, *Arbutus*, Strawberry-tree, *Clethra*, *Pyrola*, Winter green, *Proſopis*, *Heiſteria*, *Chalcas*, *Codon*, *Styrax*, Storax-tree, *Turræa*, *Dionæa*, Venus's Fly-trap, *Ekebergia*, *Inocarpus*, and *Myroxylon*.

ORDER II. DIGYNIA, comprehending ſuch plants as have two ſtyles. Of this order there are twelve genera, viz. *Royena*, African Bladder-nut, *Hydrangea*, *Cunonia*, *Chryſoſplenium*, Golden Saxifrage, *Saxifraga*, Saxifrage, *Tiarella*, *Metella*, Baſtard American Sanicle, *Scleranthus*, German Knot-graſs, or Knawel, *Trianthema*, *Gypſophila*, *Saponaria*, and *Dianthus*.

ORDER III. TRIGYNIA, comprehending ſuch plants as have three ſtyles. Of this order there are twelve genera, viz. *Cucubalus*, Berry-bearing Chick-weed, *Silene*, Viſcous Campion, *Stellaria*, Great Chick-weed, *Arenaria*, Sea Chick-weed, *Cherleria*, *Garidella*, Fennel Flower of Crete, *Malpighia*, Barbadoes Cherry, *Baniſteria*, *Triopteris*, *Erythroxylon*, *Hiræa*, and *Deutzia*.

ORDER IV. PENTAGYNIA, comprehending ſuch plants as have five ſtyles. Of this order there are fourteen genera, viz. *Averrhoa*, *Spondias*, Braſilian Plumb, *Cotyledon*, Navel-wort, *Sedum*, Leſſer Houſleek, *Penthorum*, *Oxalis*, Wood Sorrel, *Suriana*, *Lychnis*, Campion, *Agroſtema*, Campion, or wild Lichnis, *Ceraſtium*, Mouſe-ear Chick-weed, *Spergula*, Spurray, *Grielum*, *Forſkohlea*, and *Bergia*.

ORDER V. DECAGYNIA, comprehending ſuch plants as have ten ſtyles. This order contains two genera, viz. *Neurada*, and *Phytolacca*, American Night-ſhade.

Of the eleventh Claſs, DODECANDRIA.

This claſs, notwithſtanding its title, which is expreſſive of twelve ſtamina, conſiſts of ſuch plants as bear *Hermaphrodite* flowers, furniſhed with any number of ſtamina from twelve, to nineteen incluſive *. The orders are five, viz.

ORDER I. MONOGYNIA, comprehending ſuch plants as have but one ſtyle. This order contains twenty-five genera, viz. *Aſarum*, Aſarabacca, *Gethyllis*, *Bocconia*, *Rizophora*, Candle of the Indians, *Blakea*, *Garcinia*, *Winterana*, *Cratæva*, Garlick Pear, *Triumfetta*, *Baſſia*, *Peganum*, Wild Syrian Rue, *Haleſia*, *Nitraria*, *Portulaca*, Purſlane, *Hudſonia*, *Lythrum*, Willow Herb, *Ginora*, *Decumaria*, *Beſaria*, *Vatica*, *Apactis*, *Canella*, *Dodecas*, *Eurya*, and *Ariſtotelia*.

ORDER II. DIGYNIA, comprehending ſuch plants as have two ſtyles. Of this order there are two genera, viz. *Heliocarpus*, and *Agrimonia*, Agrimony.

ORDER III. TRIGYNIA, comprehending ſuch plants as have three ſtyles. This order contains five genera, viz. *Reſeda*, Baſtard Rocket, *Euphorbia*, Burning Thorny Plant, or Spurge, *Pallaſia*, *Tacca*, and *Viſnea*.

ORDER IV. PENTAGYNIA, comprehending ſuch plants as have five ſtyles. This order contains but one genus, viz. *Glinus*.

ORDER V. DODECAGYNIA, comprehending ſuch plants as have twelve ſtyles. This order contains but one genus, viz. *Sempervivum*, Houſleek.

Of the twelfth Claſs, ICOSANDRIA †.

This claſs conſiſts of ſuch plants as bear *Hermaphrodite* flowers, of the following characters, viz. 1. A calyx monophyllous, and concave. 2. The corolla faſtened by its claws to the inner ſide of the calyx. 3. The ſtamina twenty or more. As the number of ſtamina in this claſs, notwithſtanding its title, is not limited, an attention muſt be had to the two firſt characters, to diſtinguiſh the flowers from thoſe of the next claſs, with which they might otherwiſe be confounded. The orders are five, viz.

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* *Tormentilla* is an exception, belonging to the next claſs, though it has but ſixteen ſtamina. The characters of the fructification in the next claſs over-rule the number of the male part expreſſed in its title.

† This claſs furniſhes the fruits moſt in eſteem.

ORDER I. MONOGYNIA, comprehending ſuch plants as have but one ſtyle. This order contains eleven genera, viz. *Cactus*, Melon Thiſtle, *Eugenia*, *Philadelphus*, Mock Orange, *Pſidium*, Guayava, or Bay Plum, *Myrtus*, Myrtle, *Punica*, Pomegranate, *Amygdalus*, Amygdalus, *Prunus*, Plumb Tree, *Plinia*, *Chryſobalanus*, Cocoa Plumb, and *Sonneratia*.

ORDER II. DIGYNIA, comprehending ſuch plants as have two ſtyles. Of this order there is but one genus, viz. *Cratægus*, Wild Service.

ORDER III. TRIGYNIA, comprehending ſuch plants as have three ſtyles. This order contains two genera, viz. *Sorbus*, Service Tree, and *Seſuvium*.

ORDER IV. PENTAGYNIA, comprehending ſuch plants as have five ſtyles. This order contains ſix genera, viz. *Meſpilus*, Medlar, *Pyrus*, Pear, *Tetragonia*, *Meſembryanthemum*, Fig Marygold, *Aizoon*, and *Spiræa*.

ORDER V. POLYGYNIA, comprehending ſuch plants as have many ſtyles. This order contains nine genera, viz. *Roſa*, Roſe, *Rubus*, Raſpberry, *Fragaria*, Strawberry, *Potentilla*, Cinqe-foil, *Tormentilla*, Tormentil, *Geum*, Avens, or Herb Bennet, *Dryas*, *Comarum*, Marſh Cinquefoil, and *Calycanthus*, Virginian All-ſpice.

Of the thirteenth Claſs, POLYANDRIA *.

This claſs conſiſts of ſuch plants as bear *Hermaphrodite* flowers, furniſhed with many ſtamina. The diſtinction between this claſs and the twelfth may be known by having recourſe to the characters of the twelfth claſs in the preceding chapter. The orders are ſeven, viz.

ORDER I. MONOGYNIA, comprehending ſuch plants as have but one ſtyle. This order contains forty-two genera, diſtinguiſhed into, 1. Such as have ſcarce any ſtyle, of which there are thirteen, viz. *Marcgravia*, *Rhcedia*, *Capparis*,

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* The fruits of this claſs are often poiſonous; which makes it neceſſary to diſtinguiſh them from thoſe of the laſt, which abounds with eatable fruits.

paris, Caper Buſh *, *Actæa*, Herb Chriſtopher, *Sanguinaria*, Puccoon, *Podophyllum*, Duck's-foot, or May-apple, *Chelidonium*, Celandine, *Papaver*, Poppy, *Argemone*, Prickly Poppy, *Muntingia*, *Cambogia*, *Sarracena*, Side-ſaddle flower, and *Nymphæa*, Water Lily. 2. Such as have a ſtyle of ſome length, of which there are twenty-nine, viz. *Bixa*, Anotta, *Sloanea*, Aperba of the Braſilians, *Mammea*, Mammee, *Ochna*, *Calophyllum*, *Grias*, *Tilia*, Lime Tree, *Laetia*, *Elæocarpus*, *Lechythis*, *Vateria*, *Lagerſtroemia*, *Thea*, Tea-tree, *Caryophyllus*, Clove Tree, *Mentzelia*, *Delima*, *Ciſtus*, Rock Roſe, *Prockia*, *Corchorus*, Jew's Mallow, *Seguieria*, *Looſa*, *Trewia*, *Trilix*, *Alſtonia*, *Cleyera*, *Myriſtica*, *Sparrmania*, *Ternſtromia*, and *Vallea*.

ORDER II. DIGYNIA, comprehending ſuch plants as have two ſtyles. This order contains four genera, viz. *Pæonia*, Pœony, *Calligonum*, *Curatella*, and *Fothergilla*.

ORDER III. TRIGYNIA, comprehending ſuch plants as have three ſtyles. This order contains two genera, viz. *Delphinium*, Lark-ſpur, and *Aconitum*, Wolf's-bane.

ORDER IV. TETRAGYNIA, comprehending ſuch plants as have four ſtyles. This order contains three genera, viz. *Tetracera*, *Caryocar*, and *Cimicifuga*.

ORDER V. PENTAGYNIA, comprehending ſuch plants as have five ſtyles. This order contains four genera, viz. *Aquilegia*, Columbine, *Nigella*, Fennel Flower, or devil in a buſh, *Reaumuria*, and *Brathys*.

ORDER VI. HEXAGYNIA, comprehending ſuch plants as have ſix ſtyles. This order contains but one genus, viz. *Stratiotes*, Water Soldier.

ORDER VII. POLYGYNIA, comprehending ſuch plants as have many ſtyles. This order contains twenty-one genera, viz. *Dillenia*, *Liriodendron*, Tulip-tree, *Magnolia*, Laurel-leaved Tulip-tree, *Michelia*, *Uvaria*, *Annona*, Cuſtard Apple, *Anemone*, Wind flower, *Atragene*, *Clematis*, Virgin's Bower, *Thalictrum*, Meadow Rue, *Adonis*, Bird's eye, *Illicium*, *Ranunculus*, Crow-foot, *Trollius*, Globe Ranunculus, *Iſopyrum*, *Helleborus*, Black Hellebore, *Caltha*, Marſh Marygold, *Hydraſtis*, Yellow Root, *Houtuynia*, *Unona*, and *Wintera*.

Of the fourteenth Claſs, DIDYNAMIA.

This claſs conſiſts of ſuch plants as bear *Hermaphrodite* flowers, furniſhed with four ſtamina; two of which are longer than the reſt. This circumſtance would ſuffice to diſtinguiſh it from the fourth claſs, in which the four ſtamina are equal; however, as the flowers of this claſs have a particular ſtructure, there are general characters which will nearly ſerve for the whole claſs; and theſe we will give at length.

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* *Capparis* has ſome length of ſtyle.

Characters of the Claſs DIDYNAMIA.

CALYX—A perianthum, monophyllous, erect, tubulate, quinquefid, with ſegments for the moſt part unequal, and perſiſting.

COROLLA—Monopetalous and erect; the baſe of which contains the honey, and does the office of a nectarium. The upper lip ſtrait: the lower ſpreading and trifid. The middle lacinia the broadeſt.

STAMINA—Four filaments, ſubulate, inſerted in the tube of the corolla, and inclined towards the back thereof. The two inner and neareſt the ſhorteſt. All of them parallel, and rarely exceeding the length of the corolla. The antheræ lodged under the upper lip of the corolla in pairs; in each of which reſpectively the two antheræ approach each other.

PISTILLUM—The germen commonly above the receptacle. The ſtyle ſingle, filiform, bent in the ſame form as the filaments, uſually placed within them, a little exceeding them in length, and ſlightly curved towards the ſummit. The ſtigma for the moſt part emarginate.

PERICARPIUM—Either wanting (ſee the firſt order) or, if preſent, uſually bilocular (See the ſecond order.)

SEEDS—If no pericarpium, four, lodged within the hollow of the calyx, as in a capſule; but if there be a pericarpium, more numerous, and faſtened to a receptacle placed in the middle of the pericarpium.

The flowers of this claſs are for the moſt part almoſt upright, but inclining a little at an acute angle from the ſtem, that the corolla may more eaſily cover the antheræ, and that the pollen may fall on the ſtigma, and not be ſoaked with the rain. The eſſential character is in the four ſtamina; of which the two neareſt are ſhorter and all four cloſe to each other, and tranſmitted with the ſingle ſtyle of the piſtillum through a corolla that is unequal.

The orders of this claſs are two, viz.

ORDER I. GYMNOSPERMIA *, comprehending ſuch plants as have naked ſeeds. This order has theſe farther characters, viz. the ſeeds four (excepting *Phryma*, which is *monoſpermous*;) and the ſtigma *bipartite*, and *acute*, with the lower lacinia *reflexed*. It contains thirty-four genera, diſtinguiſhed into 1. Such as have the calyx quinquefid, and nearly equal, of which there are twenty, viz. *Ajuga*, Bugle, *Teucrium*, Germander, *Satureja*, Savory, *Thymbra*, Mountain Hyſſop, *Hyſſopus*, Hyſſop, *Nepeta*, Catmint, or Nep, *Lavandula*, Lavender, *Betonica*, Betony, *Sideritis*, Iron-wort, *Mentha*, Mint, *Glechoma*, Ground-ivy, or Gill, *Perilla*, *Lamium*, Dead Nettle, or Archangel, *Galeopſis*, Hedge Nettle, *Stachys*, Baſe Horehound; *Ballota*, Black Horehound, *Marrubium*, Horehound, *Leonurus*, Lion's-tail, *Phlomis*, Jeruſalem Sage, and *Moluccella*, Molucca Baum. 2. Such as have the calyx *bilabiate*, *divided into two lips*; of which there are fourteen, viz. *Clinopodium*, Field Baſil, *Origanum*, Wild Marjorum, *Thymus*, Thyme, *Meliſſa*, Baum, *Dracocephalon*, Dragon's Head, *Horminum*, Pyrenæan Clary, *Melittis*, Baum-leaved Archangel, or Baſtard Baum, *Ocymum*, Baſil, *Trichoſtema*, *Scutellaria*, Skullcap, *Prunella*, Self-heal, *Cleonia*, *Praſium*, Shrubby Hedge-nettle, and *Phryma*.

ORDER II. ANGIOSPERMIA †, comprehending ſuch plants as have the ſeeds in a *pericarpium*, which circumſtance is conſtant, and diſtinguiſhes this order from the laſt in every form. To this character may be added that of a ſtigma, commonly *obtuſe*. This order contains ſixty-nine genera, diſtinguiſhed into 1. Such as have a *ſimple* ſtigma, and *perſonate* corollæ; of which there are thirteen, viz. *Bartſia*, *Rhinanthus*, Elephant's Head, *Euphraſia*, Eye-bright, *Melampyrum*, Cow-wheat, *Lathræa*, *Schwalbea*, *Tozzia*, *Pedicularis*, Rattle Coxcomb, or Louſe-wort, *Gerardia*, *Chelone*, *Geſneria*, *Antirrhinum*, Snap Dragon, or Calves Snout, and *Cymbaria*. 2. A *ſimple* ſtigma and *ſpreading* corollæ, of which there are thirty, viz. *Craniolaria*, *Martynia*, *Torenia*, *Scrophularia*, Fig-wort, *Celſia*, *Digitalis*, Fox-glove, *Bignonia*, Trumpet Flower, *Citharexylum*, Fiddle-wood, *Halleria*, African Fly-honey-ſuckle, *Creſcentia*, Calabaſh Tree, *Gmelina*,

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* The plants of this order are ſcented, and are accounted cephalic and reſolvent. The virtue is in the leaves. They are the Labiati (lipped plants) of *Tournefort*, and Verticilati (plants that flower at the joints) of *Ray*'s Hiſt. Plant. 508.

† Theſe are the perſonati, *perſonate flowers* of *Tournefort*.

lina, *Petrea*, *Lantana*, American Viburnum, *Cornutia*, *Loeſelia*, *Capraria*, *Selago*, *Hebenſtretia*, *Erinus*, *Buchnera*, *Browallia*, *Linnæa*, *Sibthorpia*, *Limoſella*, Leaſt Water Plantain, *Hemimeris-Dombeya*, *Caſtilleja*, *Millingtonia*, *Thunbergia*, and *Amaſonia*. 3. With a double ſtigma; of which there are twenty-five, viz. *Stemodia*, *Obolaria*, *Orobanche*, Brown Rape, *Dodartia*, *Lippia*, *Seſamum*, Oily Purging-grain, *Mimulus*, Monkey Flower, *Ruellia*, *Barleria*, *Duranta*, *Ovieda*, *Volkameria*, *Clerodendron*, *Vitex*, Agnus Caſtus, or Chaſte Tree, *Bontia*, *Columnea*, *Acanthus*, Bear's Breech, *Pedalium*, *Avicennia*, *Vandelia*, *Manulea*, *Beſleria*, *Lindernia*, *Premna*, and *Hyobanche*. 4. Such as have many petals, of which there is but one genus, viz. *Melianthus*, Honey Flower.

Of the fifteenth Claſs, TETRADYNAMIA[*].

This claſs conſiſts of ſuch plants as bear *Hermaphrodite* flowers, furniſhed with ſix ſtamina, two of which are ſhorter than the reſt, by which laſt circumſtance it may be diſtinguiſhed from the ſixth claſs, whoſe flowers have ſix equal ſtamina. The flowers of this claſs are of a particular ſtructure, anſwering to the characters following.

Characters of the claſs TETRADYNAMIA.

CALYX—A perianthium tetraphyllous, and oblong; the leaves of which are ovato-oblong, concave, obtuſe, conniving, gibbous downwards at the baſe, the oppoſite ones equal and deciduous. The calyx in theſe flowers is a nectarium; which is the reaſon of the baſe being gibbous.

COROLLA—Called cruciform. Four equal petals. The claws plano-ſubulate, erect, and ſomewhat longer than the calyx. The limb plane. The laminæ widening outwards, obtuſe, the ſides hardly touching one another. The inſertion of the petals is in the ſame circle with the ſtamina.

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[*] Theſe are the *Cruciformes* (*croſs-ſhaped* Flowers) of *Tournefort*, and the *Siliculoſæ*, and the *Siliquoſæ* (plants that have pods) of *Ray*'s Hiſt. Plant. 777. This claſs is truly natural, and has been aſſumed as ſuch by all Syſtematiſts, though individuals have often added one or more genera to it, contrary to nature. *Linnæus* thinks he has given no wrong one, unleſs it be *Cleome*. The diſtinction into *Siliculoſe*, and *Siliquoſe*, is admitted by all. The plants are held to be antiſcorbutic and diuretic. The taſte in moſt is watery, mixt with a ſharpneſs. They commonly looſe their quality when dried. The eſſential character of the ſeveral genera in this claſs depends commonly on the ſituation of the nectariferous glandule.

STAMINA—The filiments ſix, and ſubulate; of which two that are oppoſite are of the length of the calyx; the other four ſomewhat longer, but not ſo long as the corolla. The antheræ oblong, acuminate, thicker at the baſe, erect, and with their tops leaning outwards. There is a nectariferous glandule, which in the different genera has various appearances; it is ſeated cloſe to the ſtamina. and particularly to the two ſhorter ones, to whoſe baſe it is faſtened; and theſe have a light curvature to prevent their preſſing upon it, whereby thoſe filaments become ſhorter than the reſt.

PISTILLUM—The germen above the receptacle increaſing daily in height. The ſtyle either of the length of the longer ſtamina, or wanting. The ſtigma obtuſe.

PERICARPIUM—A ſiliqua of two valves, often bilocular, opening from the baſe to the top. The diſſepiment projecting at the top beyond the valves, the prominent part thereof having before ſerved as a ſtyle.

SEEDS—Roundiſh, inclining downwards, alternately plunged lengthwiſe into the diſſepiment. The receptacle linear, ſurrounding the diſſepiment, and immerſed in the ſutures of the pericarpium. The orders are two, viz.

ORDER I. SILICULOSA, comprehending thoſe plants whoſe pericarpium is a ſilicula. This order contains fourteen genera, viz. *Myagrum*, Gold of Pleaſure, *Vella*, Spaniſh Creſs, *Anaſtatica*, Roſe of Jericho, *Subularia*, Rough-leaved Alyſſon, *Draba*, Whitlow Graſs, *Lepidium*, Dittander, or Pepper-wort, *Thlaſpi*, Mithridate Muſtard, or Treacle Muſtard, *Cochlearia*, Scurvy-graſs, or Spoon-wort, *Iberis*, Candy-tuft, or Sciatic Creſs, *Alyſſum*, Mad-wort, *Peltaria*, *Clypeola*, Treacle Muſtard, *Biſcutella*, Buckler Muſtard, and *Lunaria*, Moon-wort, Sattin Flower, or Honeſty.

ORDER II. SILIQUOSA, comprehending thoſe plants whoſe pericarpium is a ſiliqua *. This order contains eighteen genera, viz. *Ricotia*, *Dentaria*, Tooth-wort, *Cardamine*, Lady's Smock, *Siſymbrium*, Siſymbrium, *Eryſimum*, Hedge Muſtard, *Cheiranthus*, Stock July-flower, *Heliophola*, *Heſperis*, Dames Violet, Rocket, or Queen's July-flower, *Arabis*, Baſtard Tower Muſtard, *Turritis*, Tower Muſtard, *Braſſica*, Cabbage, *Sinapis*, Muſtard, *Raphanus*, Raddiſh, *Bunias*, *Iſatis*, Woad, *Crambe*, Sea-cabbage, *Cleome*, Baſtard Muſtard, and *Chamira*.

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* See the table of botanical terms at the end of the chapter.

Of the ſixteenth Claſs, MONADELPHIA *.

This claſs conſiſts of ſuch plants as bear hermaphrodite flowers, furniſhed with one ſet of united ſtamina. This claſs conſiſts of eight orders. The characters of the flowers are as follow.

Characters of the claſs MONODELPHIA.

CALYX—A perianthum always preſent, perſiſting, and in moſt genera double.

COROLLA—Pentapetalous, the petals heart-ſhaped; the ſides of which lap each one over the next, contrary to the motion of the ſun.

STAMINA—The filaments united below, but diſtinct upwards if there be more than one †. The exterior ones ſhorter than the interior. The antheræ incumbent.

PISTILLUM—The receptacle of the fructification prominent in the centre of the flower. The germen erect, ſurrounding the top of the receptacle in a jointed ring. The ſtyles are all united below in one ſubſtance with the receptacle, but divided above into as many threads as there are germen. The ſtigma ſpreading and thin.

PERICARPIUM—A capſule divided into as many loculaments as there are piſtilla. Its figure various in the different genera.

SEEDS—Kidney-ſhaped.

The corolla in this claſs has been called *Monopetalous*; but as the petals are all diſtinct at the baſe, it is to be ſtyled more properly *Pentapetalous*, notwithſtanding the petals cohere by the union of the ſtamina. The orders are eight, viz.

ORDER I. TRIANDRIA, comprehending ſuch plants as have three ſtamina. This order contains three genera, viz. *Aphyteja*, *Galaxia*, and *Hydnora*.

ORDER II. PENTANDRIA, comprehending ſuch plants as have five ſtamina. This order contains five genera,

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* In this claſs the calyx is of great moment for diſtinguiſhing the genera, and fixes the limits with certainty. They were formerly diſtinguiſhed by the fruit; which not being found ſufficient, recourſe was had to the leaves of the plant. The plants of this claſs are eſteemed to be emollient, and mucilaginous.

† The *Melochia* has five antheræ, btt it does not appear that there are any diſtinct filaments. See its character in the Genera Plantarum.

nera, viz. *Waltheria*, *Lerchea*, *Hermannia*, *Melochia*, and *Symphonia*.

ORDER III. OCTANDRIA, comprehending ſuch plants as have eight ſtamina. Of this order there is but one genus, viz. *Aitonia*.

ORDER IV. ENNEANDRIA, comprehending ſuch plants as have nine ſtamina. Of this order there is but one genus, viz. *Dryandra*.

ORDER V. DECANDRIA, comprehending ſuch plants as have ten ſtamina. This order contains three genera, viz, *Conarus*, *Geranium* *, and *Hugonia*.

ORDER VI. ENDECANDRIA, comprehending ſuch plants as have eleven ſtamina. Of this order there is only one genus, viz. *Brownea*.

ORDER VII. DODECANDRIA, comprehending ſuch plants as have twelve ſtamina. This order contains only one genus, viz. *Pentapetes*.

ORDER VIII. POLYANDRIA, comprehending ſuch plants as have many ſtamina. This order contains twenty-one genera, viz. *Bombax*, Silk Cotton-tree, *Sida*, Indian Mallow, *Adanſonia*, Æthyopean Sower Gourd, *Althæa*, Marſh Mallow, *Alcea*, Holly-hock, or Roſe Mallow, *Malva*, Mallow, *Lavatera*, *Malope*, Baſtard Mallow, *Urena*, Indian Mallow, *Goſſypium*, Cotton, *Hibiſcus*, Althea Frutex, or Syrian Mallow, *Stewartia*, *Camellia*, *Moriſonia*, *Meſua*, Indian Roſe-cheſnut, *Malachra*, *Gordonia*, *Guſtavea*, *Corolinea*, *Barringtonia*, and *Solandra*.

Of the ſeventeenth Claſs, DIADELPHIA.

This claſs conſiſts of ſuch plants as bear *hermaphrodite* flowers, furniſhed with two ſets of united ſtamina. The characters of the fructification are as follow.

Characters of the claſs DIADELPHIA.

CALYX—A perianthium monophyllous, campanulate, and withering. The baſe gibbous, the lower part thereof faſtened to the peduncle, the upper obtuſe and melliferous. The brim quinquedentate, acute, erect, oblique, unequal. The loweſt odd denticle longer than the reſt; the upper pair ſhorter and farther aſunder. The bottom of the cavity moiſt with a melleous liquor, including the receptacle.

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* The ſpecies of this genus varies ſingularly in the number of ſtamina and other circumſtances, viz. from 1 to 22 they have ſeven fertile ſtamina, the leaves alternate and many flowers on a peduncle; from 23 to 35 they have ſeven fertile ſtamina, and the leaves growing oppoſite; from 36 to 45 five fertile ſtamina, the calyx five leaves, and the fruit declined; from 46 to 58 ten fertile ſtamina, and two flowers on a peduncle; from 59 to 68 ten fertile ſtamina, two flowers on a peduncle, and the plants annual; from 69 to 82 ten fertile ſtamina, and one flower on a peduncle.

COROLLA—Termed papilionaceous, unequal; the petals expreſſed by diſtinct names, viz.

Vexillum, the *ſtandard*; a petal covering the reſt, incumbent, greater, plano-horizontal, inſerted by its claw in the upper margin of the receptacle, approaching to a circular figure when it leaves the calyx, and nearly entire; along it, and eſpecially towards its extremity, runs a line, or ridge, that riſes up, as if the lower part of the petal had been compreſſed; the part of the petal next to the baſe approaching to a ſemicylindric figure, embraces the parts that lie under it. The diſk of the petal is depreſſed on each ſide, but the ſides of it neareſt the margin are reflexed upwards. Where the halved tube ends, and the halved limb begins to unfold itſelf, are two concave impreſſions prominent underneath, and compreſſing the wings, that lie under them.

Alæ, the *Wings*, two equal petals, one at each ſide of the flower, placed under the vexillum; incumbent with their margins parallel, roundiſh, or oblong, broader upwards, the upper margin ſtraighter, the lower ſpreading more into a roundneſs; the baſe of each wing bifid, the lower diviſion ſtretching out into a claw, inſerted in the ſide of the receptacle, and about the length of the calyx; the upper ſhorter and inflexed.

Carina, the *Keel*, the loweſt petal, often bipartite, placed under the vexillum and between the alæ; boat-ſhaped, concave, compreſſed on the ſides, ſet like a veſſel afloat, mutilate at the baſe, the lower part of which runs into a claw of the length of the calyx, and inſerted in the receptacle, but the upper and ſide laciniæ are interwoven with that part of the alæ that is of the ſame ſhape. The form of the ſides of the carina, is much like that of the alæ; and ſo alſo is their ſituation, except that they are lower, and ſtand within them. The line that forms the *Carina* or *Keel*, in this petal, runs ſtraight as far as the middle, and then riſes gradually in the ſegment of a circle, but the marginal line runs ſtraight to the extremity, where meeting the carinal, they terminate obtuſely.

STAMINA—Called *Diadelphia.* The filaments two, of different forms, viz. a lower one that involves the piſtillum, and an upper one incumbent on it. The former of theſe, from the middle downwards, is cylindraceous, membranaceous, and ſplit lengthwiſe on its upper ſide; but the upper half terminates in nine ſubulate * parts, that are of the ſame length with, and follow the flexure of the carina of the corolla, and of which the intermediate or lower radii † are longer by alternate pairs. The upper filament is ſubulato-ſetoſe ‡, covering the ſplitting of the former cylindraceous filament, incumbent on it, anſwering to it in ſituation, ſimple and gradually ſhorter; its baſe is detached from the reſt, and prepares an outlet for the honey on each ſide. The antheræ reckoned all together are ten, one on the upper filament, and nine on the lower, each of the radii being furniſhed with a ſingle one; they are ſmall, all of one ſize, and terminate the radii.

PISTILLUM—Single, growing out of the receptacle, within the calyx. The germen oblong, roundiſh, lightly compreſſed, ſtraight, of the length of the cylinder of the lower filament which involves it. The ſtyle ſubulate, filiform, aſcending, having the ſame length and poſition as the radii of the filament among which it is placed, and withering. The ſtigma downy, of the length of the ſtyle from the part turned upwards, and placed immediately under the antheræ.

PERICARPIUM—A legumen, oblong, compreſſed, obtuſe, bivalved, with a longitudinal ſuture both above and below; each ſuture ſtraight, though the upper one falls near the baſe, and the lower one riſes near the top. The legumen opens at the upper ſuture.

SEEDS—A few, roundiſh, ſmooth, fleſhy, pendulous, marked with an embryo that is a little prominent towards the point of inſertion. When the ova are hatched, the cotyledons preſerve the form of the halved ſeed.

RECEPTACLE—The proper receptacles of the ſeeds are very ſmall, very ſhort, thinner towards the baſe, obtuſe at the diſk that faſtens them, oblong, inſerted longitudinally in the upper ſuture of the legumen only, but placed alternate; ſo that when the valvulæ have been parted, the ſeeds adhere alternately to each of the valves.

The ordinary ſituation of the flowers is obliquely pendulous; that is, at an acute angle from the perpendicular. The orders are four, viz.

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* Awl-ſhaped.

† Rays, meaning the diviſions of the filaments.

‡ Awl-ſhaped, and like a briſtle.

Order I. PENTANDRIA, comprehending ſuch plants as have five ſtamina. Of this order there is only one genus, viz. *Monnieria*.

Order II. HEXANDRIA, comprehending ſuch plants as have ſix ſtamina. This order contains two genera, viz. *Fumaria*, Fumitory, and *Saraca*.

Order III. OCTANDRIA, comprehending ſuch plants as have eight ſtamina. This order contains three genera, viz. *Polygala*, Milkwort, *Securidaca*, and *Dalbergia*.

Order IV. DECANDRIA, comprehending ſuch plants as have ten ſtamina. This order contains fifty genera, diſtinguiſhed into 1. Such as have monodelphous * filaments; of which there are ſeventeen, viz. *Niſſolia*, *Erythrina*, Coral Tree, *Piſcidia*, *Borbonia*, *Spartium*, Broom, *Geniſta*, Single-ſeeded Broom, *Aſpalathus*, African Broom, *Amorpha*, Baſtard Indigo, *Crotolaria*, *Ononis*, Root Harrow, *Anthyllis*, Kidney Vetch, or Lady's Finger, *Ebenus*, Ebony of Crete, *Abrus*, *Pterocarpus*, *Ulex*, Furze, Whins, or Gorſs, *Arachis*, Ground Nut, and *Lupinus*, Lupine. 2. Such as have *diadelphious* † filaments and downy ſtigma; of which there are ten, viz. *Phaſeolus*, Kidney Bean, *Dolichus*, *Glycine*, Carolina Kidney Bean Tree, *Clitoria*, *Piſum*, Pea, *Orobus*, Bitter Vetch, *Lathyrus*, Chichling Vetch, *Vicia*, Vetch, *Cicer*, Chich Peas, and *Ervum*, Bitter Vetch. 3. Such as have diadelphious filaments, bilabiate calyces, and the ſtigma not downy, of which there are ſix, viz. *Cytiſus*, Baſe Tree, Trefoil, *Geoffroya*, *Robinia*, Falſe Acacia, *Colutea*, Bladder Senna, *Glycirrhiza*, Liquorice, and *Coronilla*, Jointed-podded Colutea. 4. Such as have diadelphious filaments, ſtigma that are not downy, and calyces not bilabiate; of which there are ſeventeen, viz. *Ornithopus*, Bird's Foot, *Hippocrepis*, Horſe-ſhoe Vetch, *Scorpiurus*, Caterpillars, *Hedyſarum*, French Honeyſuckle, *Æſchynomene*, Baſtard Senſitive Plant, *Indegofera*, Indigo, *Galega*, Goat's Rue, *Phaca*, Baſtard Milk Vetch, *Aſtragalus*, Liquorice Vetch, or Milk Vetch, *Biſerrula*, *Pſorulea*, *Trifolium*, Trefoil, *Lotus*, Bird's Foot Trefoil, *Liparia*, *Trigonella*, Fenugreek, *Medicago*, Sail and Moon Trefoil, and *Mullera*.

Of the eighteenth Claſs, Polyadelphia.] This claſs conſiſts of ſuch plants as bear hermaphrodite flowers, furniſhed with many ſets of united ſtamina: the flowers have no particular character farther than is expreſſed in the title. The orders are four, viz.

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* One ſet, or brotherhood.

† Two ſets, or brotherhoods.

ORDER I. PENTANDRIA, comprehending ſuch plants as have five ſtamina in each ſet. Of this order there are two genera, viz. *Theobroma*, Chocolate Nut, and *Abroma*.

ORDER II. DODECANDRIA, comprehending ſuch plants as have twelve ſtamina in each ſet. Of this order there is but one genus, viz. *Monſonia*.

ORDER III. ICOSANDRIA, comprehending ſuch plants as have twenty ſtamina in each ſet. Of this order there is but one genus, viz. *Citrus*, Citron.

ORDER IV. POLYANDRIA, comprehending ſuch plants as have many ſtamina in each ſet. This order contains eight genera, viz. *Hypericum*, St. John's Wort, *Aſcyrum*, St. Peter's Wort, *Hopea*, *Symplocos*, *Melaleuca*, *Durio*, *Munchhauſia*, and *Glabraria*.

Of the nineteenth claſs, SYNGENESIA *.] This claſs conſiſts of ſuch plants as bear *compound* flowers. We have already paved the way for underſtanding this claſs, by the explanation of the titles of the claſs and its orders. What is farther neceſſary here, is to give the characters of the flowers. Compound flowers admit of a double deſcription, viz. of the whole flower in its aggregate ſtate, which is termed the *Floſculoſe Flower*; and 2. of the *Floſculi Florets*, of which it is compoſed. We ſhall begin with the firſt, which concerns only the calyx and receptacle, thoſe being the only parts that are in common.

Characters of the *Floſculoſe Flower*.

CALYX—The common calyx is a perianthium, which contains the florets and the receptacle. It is either *ſimple*, *augmented*, or *imbricated*. It contracts when the flowers are fallen, but expands and turns back when the ſeeds are ripe.

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* This claſs of compound flowers is a natural one, if we except the laſt order; which, upon the ſyſtematic principles aſſumed, could not be refuſed an admiſſion into it. Its plants are commonly bitter and ſtomachic.

RECEPTACLE—The common receptacle of the fructification receives many ſeſſile florets on its diſk, which is either *concave*, *plain*, *convex*, *pyramidal*, or *globoſe*. The ſurface of the diſk is either naked, without any other inequality than that of being lightly dotted; *villoſe*, covered with upright hairs; or *paleaceous*, covered with *paleæ*, *chaffs*, or *ſtraws*, that are linear, ſubulate, compreſſed, and erect, and ſerve to part the florets.

Characters of the *Florets*.

CALYX—A ſmall perianthium, often quinquepartite, ſeated on the germen, perſiſting, and becoming the crown of the ſeed.

COROLLA—Monopetalous with a long and very narrow tube. It is ſeated on the germen, and is either *tubulate*, with the limb campanulate and quinquefid, and the laciniæ ſpreading and turning back; *ligulate*, with the limb linear, plane, turned outwards, and the top whole; *tridentate*, or *quinquedentate*; or wanting, having no limb, and often no tube.

STAMINA—The filaments five, capillary, very ſhort, inſerted in the neck of the corollulæ. The antheræ five, linear erect; and by the union of their ſides forming a cylinder, that is tubulate, quinquedentate, and of the length of the limb.

PISTILLUM—The germen oblong, placed under the receptacle of the flower; the ſtyle filiform, erect, of the length of the ſtamina, and perforating the cylinder of the antheræ; the ſtigma bipartite, the laciniæ revolute and ſpreading aſunder.

PERICARPIUM—No true one, though in ſome there is a coriaceous cruſt.

SEED—A ſingle one, oblong, often tetragonous, but commonly narrower at the baſe. It is either crowned, or with the crown wanting. The crown is of two kinds, either a pappus, or a perianthium; if a pappus, it is either ſeſſile, or placed on a ſtipes; and conſiſts of many radii, that are placed in a round, and are either ſimple, radiate, or ramoſe; when the crown is a perianthium, it is ſuch as is deſcribed above under that head.

The eſſence of a *floſculoſe* flower conſiſts in having the antheræ united in a cylinder, and a ſingle ſeed below the receptacle of the floret. The orders of this claſs are ſix, viz.

ORDER I. POLYGAMIA ÆQUALIS, comprehending ſuch plants as have compound flowers, of which the florets are all *hermaphrodite*. This order contains forty-two genera, diſtinguiſhed into 1. Such as have *ligulate* compound flowers, of which there are nineteen, viz. *Geropogon*, *Tragopogon*, Goat's Beard, *Scorzonera*, Viper Graſs, *Picris*, *Sonchus*, Sowthiſtle, *Lactuca*, Lettuce, *Chondrilla*, Gum Succory, *Prenanthes*, Wild Lettuce, *Leontodon*, Dandelion, *Hieracium*, Hawkweed, *Crepis*, Baſtard Hawkweed, *Andriala*, Downy Sowthiſtle, *Hyoſeris*, *Seriola*, *Hypochæris*, *Lapſana*, Nipple-wort, *Catananche*, Candy Lion's Foot, *Cichorium*, Succory or Endive, and *Scolymus*, Golden Thiſtle. 2. Such as have *tubuloſe* compound flowers; of which there are twenty-three, viz. *Arctium*, Burdock, *Serratula*, Saw-wort, *Carduus*, Thiſtle, *Cnicus*, Bleſſed Thiſtle, *Onoperdon*, Woolly Thiſtle, *Cynara*, Artichoke, *Carlina*, Carline Thiſtle, *Carthamus*, Baſtard Saffron, *Bidens*, Water Hemp Agrimony, *Cacalia*, Alpine Colt's Foot, *Atractylis*, Diſtaff Thiſtle, *Eupatorium*, Hemp Agrimony, *Ageratum*, Baſtard Hemp Agrimony, *Ethulia*, *Staehelina*, *Chryſocoma*, Goldy Locks, *Calea*, *Tarchonanthus*, African Fleabane, *Pteronia*, *Athanaſia*, *Spilanthus*, *Santolina*, Lavender Cotton, and *Barnadeſia*.

ORDER II. POLYGAMIA SUPERFLUA, comprehending ſuch plants as have the florets of the *diſk hermaphrodite*, and thoſe of the radius female. This order contains thirty-eight genera, diſtinguiſhed into 1. *Tubuloſe*; of which there are eight, viz. *Tanacetum*, Tanſey, *Artemiſia*, Mugwort, *Gnaphalium*, Cudweed, *Xeranthemum*, Auſtrian Sneezewort, or Eternal Flower, *Carpeſium*, *Baccharis*, Plowman's Spikenard, *Cotula*, and *Conyza*, Fleabane. 2. *Radiate*; of which there are thirty, viz. *Erigeron*, *Tuſſilago*, Coltsfoot, *Senecio*, Groundſel, *Aſter*, Star-wort, *Solidago*, Golden Rod, *Inula*, Elacampane, *Cineraria*, Sky Flower, *Arnica*, *Doronicum*, Leopard's Bane, *Perdicium*, *Helenium*, Baſtard Sun Flower, *Bellis*, *Leyſera*, *Tagetes*, African Marygold, *Pectis*, *Chryſanthemum*, Corn Marygold, *Matricaria*, Feverfew, *Anacyclus*, *Anthemis*, Chamomile, *Achillea*, Millfoil, *Tridax*, Trailing Starwort of Vera Cruz *Zinnia*, *Verbeſina*, *Sigeſbeckia*, *Bupthalmum*, Ox Eye, *Eclipta*, *Bellium*, *Amellus*, *Unxia*, and *Mutiſia*.

ORDER III. POLYGAMIA FRUSTRANEA, comprehending ſuch plants as have the florets of the *diſk hermaphrodite*, and thoſe of the radius neuter. This order contains nine genera, all *radiate*, viz. *Helianthus*, Sun Flower, *Rudbeckia*, Dwarf Sun Flower, *Coreopſis*, Tick-ſeeded Sun Flower, *Gorteria*, *Oſmites*, *Zoegea*, *Centaurea*, Centaury, *Sclerocarpus*, and *Didelta*.

ORDER IV. POLYGAMIA NECESSARIA, comprehending ſuch plants as have flowers of the *diſk* male, and thoſe of the *radius* female. This order contains fourteen genera, moſt of which are *radiate*, viz. *Milleria*, *Silphium*, Baſtard Chryſanthemum, *Chryſogonum*, *Melampodium*, *Calendula*, Marygold, *Arctotis*, *Oſteoſpermum*, Hard-ſeeded Cryſanthemum, *Othonna*, African Ragwort, *Polymnia*, *Eriocephalus*, *Filago*, Cottonweed, *Micropus*, Baſtard Cudweed, *Baltimora*, and *Hippia*.

ORDER V. POLYGAMIA SEGREGATA. This order comprehends ſuch plants as have *many* partial cups contained in the common calyx, which ſeparate and ſurround the floſcula. This order contains ſeven genera, diſtinguiſhed into 1. Such as have four floſculi in each partial calyx; of which there are two genera, viz. *Elephantopus*, and *Oedera*. 2. Such as have *many* floſculi in each partial calyx; of which there is only one genus, viz. *Sphæranthus*. 3. Suchas have one floſculus in each partial calyx; of which there are three genera, viz. *Echinops*, *Gundelia*, and *Stoebe*. 4. Such as have three floſculi in each partial cup, of which there is only one genus, viz. *Jungia*.

ORDER VI. MONOGAMIA, comprehending ſuch plants as have *ſimple* flowers. This order contains ſeven genera, viz. *Strumfia*, *Seriphium*, *Corymbium*, *Jaſione*, Sheep Scalions, *Lobelia*, Cardinal Flower, *Viola*, Violet, and *Impatiens*, Balſam, or Female Balſamine.

Of the twentieth claſs, GYNANDRIA *.] This claſs conſiſts of ſuch plants as have the *ſtamina* growing either upon the *ſtyle* itſelf, or upon a receptacle that ſtretches out into the form of a ſtyle, and ſupports both the ſtamina and the piſtillum. The orders are nine, viz.

ORDER I. DIANDRIA †, comprehending ſuch plants as have two ſtamina. The flowers of this order have a

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* All the flowers of this claſs have a monſtrous appearance, owing to the uncommon ſituation of the parts of fructification.

† This order is a natural one, the genera differing only in reſpect of the nectarium. This part Linnæus conſiders as a mark of diſtinction for theſe genera, far preferable to the root, though not received as ſuch by former botaniſts.

moſt

moſt ſingular ſtructure, anſwering to the following deſcription.

Characters of the Order DIANDRIA, *of the Claſs* GYNANDRIA.

The *germen* is always contort *; the *petals* are five; of which the two inner ones uſually approach and form a galea †; the lower lip of which becomes a nectarium, and ſerves alſo for a piſtillum and ſixth petal. The ſtyle grows to the inner margin of the nectarium in ſuch a manner, as to be with its ſtigma ſcarce either of them diſtinguiſhable. The filaments are always two, ſupporting as many antheræ, which are narrower downwards, naked, or without tunic, and diviſible, like the pulp of a citrus. Theſe laſt are covered by little cells, that are open underneath, and grow to the inner margin itſelf of the nectarium. The fruit is a capſule, that is unilocula, trivalved, and ſplits in the angles under the carinate ‡ ribs. The ſeeds are ſcobiform ‖, numerous, affixed to a linear receptacle in each valvule.

ORDER I. DIANDRIA, comprehending ſuch plants as have two ſtamina, this order contains eleven genera, viz. *Orchis*, *Satyrium*, Lizard Flower, *Ophrys*, Twyblade, *Serapias*, Helleborine, *Limodorum*, *Arethuſa*, *Cypripedium*, Ladies Slipper, *Epidendrum*, Vanilla or Vanelloe, *Gunnera*, *Forſtera*, and *Diſa*.

ORDER II. TRIANDRIA, comprehending ſuch plants as have three ſtamina. This order contains four genera, viz. *Siſyrinchium*, Bermudiana, *Ferraria*, *Stilago*, and *Salacia*.

ORDER III. TETRANDRIA, comprehending ſuch plants as have four ſtamina. Of this order there is but one genus, viz. *Nepenthes*.

ORDER IV. PENTRANDRIA, comprehending ſuch plants as have five ſtamina. This order contains three genera, viz. *Paſſiflora*, Paſſion Flower, *Gluta*, and *Ayenia*.

ORDER V. HEXANDRIA, comprehending ſuch plants as have ſix ſtamina. This order contains two genera, viz. *Ariſtolochia*, Birthwort, and *Piſtia*

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* Twiſted like a ſcrew.

† Helmet.

‡ Keel ſhaped

‖ Like filings or ſaw-duſt, *i. e.* very ſmall.

ORDER VI. OCTANDRIA, comprehending ſuch plants as have eight ſtamina. Of this order there is only one genus, viz. *Scopolia*.

ORDER VII. DECANDRIA, comprehending ſuch plants as have ten ſtamina. Of this order there are but two genera, viz. *Helicteres*, Skrew Tree, and *Kleinhovia*.

ORDER VIII. DODECANDRIA, comprehending ſuch plants as have twelve ſtamina. This order contains but one genus, viz. *Cytinus*.

ORDER IX. POLYANDRIA, comprehending ſuch plants as have many ſtamina. This order contains eight genera, viz. *Grewia*, *Xylopia*, *Arum*, Wake Robin, or Cuckoo Pint, *Dracontium*, Dragons, *Calla*, African Arum, *Pothos*, *Ambroſinia*, and *Zoſtera*, Graſs Wrack.

Of the twenty-firſt Claſs, MONOECIA.] This claſs conſiſts of ſuch plants as have no hermaphrodite flowers, but bear both male and female flowers on the ſame plant*. The orders of this claſs are eleven, viz.

ORDER I. MONANDRIA, comprehending ſuch plants as have their male flowers furniſhed with one ſtamen. This order contains ten genera, viz. *Zanichellia*, Triple-headed Pond Weed, *Ceratocarpus*, *Cynomorium*, *Elaterium*, *Chara*, *Ægopricon*, *Artocarpus*, *Nipa*, *Caſuarina*, and *Phyllachne*.

ORDER II. DIANDRIA, comprehending ſuch plants as have their male flowers furniſhed with two ſtamina. This order contains two genera, viz. *Lemna*, Duck Meat, and *Anguria*.

ORDER III. TRIANDRIA, comprehending ſuch plants as have their male flowers furniſhed with three ſtamina. This order contains twelve genera, viz. *Omphalea*, *Typha*, Cat's Tail, or Reed Mace, *Sparganium*, Burr Reed, *Zea*, Indian or Turkey Wheat, *Coix*, Job's Tears, *Tripſacum*, *Olyra*, *Carex*, *Axyris*, *Tragia*, *Hernandia*, Jack in a Box, and *Phyllanthus*, Sea-ſide Laurel.

ORDER IV. TETRANDRIA, comprehending ſuch plants as have their male flowers furniſhed with four ſtamina. This order contains nine genera, viz. *Centella*, *Betula*, Birch, *Buxus*, Box Tree, *Urtica*, Nettle, *Morus*, Mulberry Tree, *Cicca*, *Serpicula*, *Littorella*, and *Aucuba*.

ORDER V. PENTANDRIA, comprehending ſuch plants as have the male flowers furniſhed with five ſtamina.

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* Theſe are the androgynous plants.

This order contains eight genera, viz. *Xanthium*, Leſſer Burdock, *Ambroſia*, *Parthenium*, Baſtard Feverfew, *Iva*, Jeſuits Bark Tree, *Leea*, *Amaranthus*, Amaranth or Flower Gentle, *Nephelium*, and *Clibadium*.

ORDER VI. HEXANDRIA, comprehending ſuch plants as have their male flowers furniſhed with ſix ſtamina. Of this order there are two genera, viz. *Zizania*, and *Pharus*.

ORDER VII. HEPTANDRIA, comprehending ſuch plants as have their male flowers furniſhed with ſeven ſtamina. Of this order there is but one genus, viz. *Guettarda*.

ORDER VIII. POLYANDRIA, comprehending ſuch plants as have their male flowers furniſhed with many ſtamina. This order contains thirteen genera, viz. *Ceratophillum*, *Myriophillum*, Water Millfoil, *Sagittaria*, Arrowhead, *Begonia*, *Theligonum*, Dogs Cabbage, *Poterium*, Burnet, *Quercus*, Oak, *Juglans*, Walnut, *Fagus*, Beech, *Carpinus*, Hornbeam, *Corylus*, Hazel or Nut-tree, *Platanus*, Plane-tree, and *Liquidambar*, Sweet Gum.

ORDER IX. MONADELPHIA, comprehending ſuch plants as have their male flowers furniſhed with one ſet of united ſtamina. This order contains fifteen genera, viz. *Hura*, Sand Box-tree, *Pinus*, Pine-tree, *Cupreſſus*, Cyprus, *Thuja*, Arbor Vitæ, *Acalypha*, *Delechampia*, *Plukenetia*, *Cupania*, *Croton*, Tallow-tree, or Baſtard Licinus, *Ricinus*, Palma Chriſti, *Jatropha*, Caſſava, *Sterculia*, *Hippomane*, Manchineal, *Stillingia*, and *Gnetum*.

ORDER X. SYNGENESIA, comprehending ſuch plants as have their male flowers furniſhed with ſtamina, of which the antheræ are united. This order contains ſix genera, viz. *Tricoſanthes*, Serpent Cucumber, *Momordica*, Male Balſam Apple, *Cucumis*, *Cucurbita*, Gourd, *Sicyos*, Single-ſeeded Cucumber, and *Bryonia*, Bryony.

ORDER XI. GYNANDRIA, comprehending ſuch plants as have their male flowers funiſhed with ſtamina that grow out of a kind of ſtyle, or imperfect *piſtillum*, the perfect one being in the female flower. This order contains two genera, viz. *Andrachne*, Baſtard Orpine, and *Agyneia*.

Of the twenty-ſecond Claſs, DIOECIA.] This claſs conſiſts of ſuch plants as have no hermaphrodite flowers, but bear male and female flowers on diſtinct plants. The orders of this claſs are fourteen, viz.

ORDER I. MONANDRIA, comprehending ſuch plants as have their male flowers furniſhed with one ſtamen. This order contains only two genera, viz. *Najas*, and *Pandanus*.

ORDER II. DIANDRIA, comprehending ſuch plants as have their male flowers furniſhed with two ſtamina. This order contains three genera, viz. *Vallisneria*, *Salix*, Willow, and *Cecropia*.

ORDER III. TRIANDRIA, comprehending ſuch plants as have their male flowers furniſhed with three ſtamina. This order contains ſix genera. viz. *Empetrum*, Black-berried Heath, or Crow-berries, *Oſyris*, Poet's Caſſia, *Caturus*, *Excoecaria*, *Reſtio*, and *Maba*.

ORDER IV. TETRANDRIA, comprehending ſuch plants as have their male flowers furniſhed with four ſtamina. This order contains ſeven genera, viz. *Viſcum*, Miſletoe, *Hippophæ*, Sea Buckthorn, *Myrica*, Candleberry Myrtlegale, or Sweet Willow, *Trophis*, *Batis*, *Montinia*, and *Brucea*.

ORDER V. PENTANDRIA, comprehending ſuch plants as have their male flowers furniſhed with five ſtamina. This order contains twelve genera, viz. *Piſtacia*, Piſtacia Nut, *Zanthoxylum*, Tooth-ach Tree, *Aſtronium*, *Ireſine*, *Antideſma*, *Spinacia*, Spinage, *Acnida*, *Cannabis*, Hemp, *Humulus*, Hop, *Zanonia*, *Fewillea*, and *Canarium*.

ORDER VI. HEXANDRIA, comprehending ſuch plants as have their male flowers furniſhed with ſix ſtamina. This order contains four genera, viz. *Tamus*, Black Bryony, *Smilax*, Rough Bindweed, *Rajania*, and *Dioſcorea*.

ORDER VII. OCTANDRIA, comprehending ſuch plants as have their male flowers furniſhed with eight ſtamina. This order contains three genera, viz. *Populus*, Poplar, *Rhodiola*, Roſe Root, and *Magaritaria*.

ORDER VIII. ENNEANDRIA, comprehending ſuch plants as have their male flowers furniſhed with nine ſtamina. This order contains two genera, viz. *Mercurialis*, Mercury, and *Hydrocharis*, Frog's Bit.

ORDER IX. DECANDRIA, comprehending ſuch plants as have their male flowers furniſhed with ten ſtamina. This order contains four genera, viz. *Carica*, Papaw, *Kiggelaria*, *Coriaria*, Myrtle-leaved Sumach, and *Schinus*, Indian Maſtick.

ORDER X. DODECANDRIA, comprehending ſuch plants as have their male Flowers furniſhed with twelve ſtamina. This order contains three genera, viz. *Meniſpermum*, Moon Seed, *Datiſca*, Baſtard Hemp, and *Euclea*.

Order XI. ICOSANDRIA, comprehending ſuch plants as have their male flowers furniſhed with many ſtamina inſerted into the calyx. Of this order there is but one genus, viz. *Flacourtia*.

Order XII. POLYANDRIA, comprehending ſuch plants as have their male flowers furniſhed with many ſtamina. Of this order there are two genera, viz *Cliffortia*, and *Hedycaria*.

Order XIII. MONADELPHIA, comprehending ſuch plants as have their male flowers furniſhed with one ſet of united ſtamina. This order contains ſix genera, vix *Taxus*, Yew Tree, *Juniperus*, Juniper, *Ephedra*, Shrubby Horſe-tail, *Ciſſampelos*, *Napæa*, and *Adelia*.

Order XIV. SYNGENESIA, comprehending ſuch plants as have their male flowers furniſhed with ſtamina, of which the antheræ are united. Of this order there is but one genus, viz. *Ruſcus*, Knee Holly, or Butcher's Broom.

Order XV. GYNANDRIA, comprehending ſuch plants as have their male flowers furniſhed with ſtamina that grow out of a kind of ſtyle, or imperfect piſtillum, the perfect one being in the female flower. Of this order there is but one genus, viz. *Clutia*.

Of the twenty-third Claſs, Polygamia.] This claſs conſiſts of ſuch plants as bear hermaphrodite flowers, and alſo either male or female flowers, or both. The orders of this claſs are three, viz.

Order I. MONOECIA, comprehending ſuch plants as have the polygamy on the ſame plant. This order contains twenty-four genera, diſtinguiſhed into 1. Such as are polygamous by male hermaphrodites, and female hermaphrodites; of which there is but one genus, viz. *Muſa*, Plantain Tree. 2. By hermaphrodites and males; of which there are twenty-two, viz. *Ophioxylon*, *Celtis*, Nettle Tree, *Veratrum*, White Hellebore, *Fuſanus*, *Andropogon*, *Holcus*, Indian Millet, *Apluda*, *Iſchæmum*, *Cenchras*, *Ægilops*, *Valantia*, Croſs-wort, *Parietaria*, Pellitory, *Atriplex*, Orach, *Brabeium*, African Almond, *Acer*, Maple, *Gouania*, *Solandra*, *Terminalia*, *Cluſia*, Balſam Tree, *Hermas*, *Spinifex*, and *Maniſurus*. 3. By hermaphrodites, and females; of which there is one genus, viz. *Mimoſa*, Senſitive Plant.

ORDER II. DIOECIA, comprehending ſuch plants as have the polygamy on two diſtinct plants. This order contains ten genera, diſtinguiſhed into 1. Such as are polygamous by hermaphrodites and females; of which there are two, viz. *Fraxinus*, Aſh, and *Gleditſia* *, Three-thorned Acachia. 2. By hermaphrodites and males; of which there are three, viz. *Dioſpyrus*, Indian Date Plumb, *Nyſſa*, Dupelo Tree, and *Piſonia*, Fringrigo. 3. By androgynous and males; of which there are five, viz. *Anthoſpermum*, Amber Tree, *Arctopus*, *Panax*, Ginſeng, *Chryſitrix*, and *Stilbe.*

ORDER III. TRIOECIA, comprehending ſuch plants as have the polygamy on three diſtinct plants. This order contains two genera, viz. *Ficus*, Fig, and *Ceratonia*, Carob Tree, or St. John's Bread.

Of the twenty-fourth Claſs, CRYPTOGAMIA †.] This claſs conſiſts of ſuch plants as conceal their fructification, having their flowers either within the fruit, or ſo ſmall, as not to be perceptible to the naked eye. The fructification of theſe is alſo of an uncommon ſtructure. The orders are four, viz.

ORDER I. FILICES, Ferns, comprehending ſuch plants as are dorſiferous ‡. What is known of the fructification of theſe plants, amounts only to the few characters following.

Characters of the FILICES.

CALYX—A ſquama growing out of the leaf, opening on one of its ſides; and under which there are pedunculate globules; each globule is girt with an elaſtic ring, which breaks elaſtically, and ſheds a duſt, which are the ſeeds.

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* In gleditſia the hermaphrodites and males are on the ſame plant, and the females on a diſtinct one.

† The plants of this claſs are often of a dangerous quality.

‡ Bearing the fruit on the back of the leaf. Theſe have been called alſo epiphylloſpermous, a Greek compound, expreſſive of the ſame circumſtance; capillary, as being eſteemed good for the hair; and acaules, without ſtems; for in theſe plants, what riſes out of the ground is plainly a leaf only; one of the characters of a ſtem or trunk is to be alike on every ſide; but in the ſtalks of ferns, there is manifeſtly a front and back, the former being flat and channelled, and the latter convex; which ſhews them to be leaves.

This order contains eighteen genera; which, not admiting of any certain diſtinction from their fructification, have been ranged by Linnæus according to their ſituation under their covers, and are as follows, viz. *Cycas*, Sego Palm, *Zamia*, *Equiſetum*, Horſe Tail, *Onoclea*, Senſible Polypody, *Ophioglоſſum*, Adder's Tongue, *Oſmunda*, Oſmund Royal, or Flowering Fern, *Acroſticum*, Forked Fern, *Pteris*, Braks, or Female Fern, *Blechnum*, *Hemionitis*, Mule's Fern, *Lonchitis*, Rough Spleenwort, *Aſplenium*, Spleenwort, or Miltwaſte, *Polypodium*, Polypody, *Adianthum*, Maiden Hair, *Trichomanes*, *Marſilea*, *Pilularia*, Pepper Graſs, and *Iſoetes*.

ORDER II. MUSCI, Moſſes. The character of the plants comprehended under this title are, antheræ without filaments; the female flowers diſtinct, and without any piſtillum; and the ſeeds, conſiſting only of a naked corculum, without cotyledon or tunic. The genera of this order have been diſtinguiſhed by Linnæus, according to the following circumſtance, viz. the antheræ, with or without a calyptra [*], placed on the ſame plant as the female floret, or on a diſtinct one; and the female aggregate, or ſingle. The order contains eleven genera, viz. *Lycopodium*, Wolf's Claw Moſs, *Porella*, *Sphagnum*, Bog Moſs, *Phaſcum*, *Splachnum*, *Polytrichum*, Golden Maiden Hair, *Mnium*, *Bryum*, *Hypnum*, *Fontinalis*, Water Moſs, and *Buxbaumia*.

ORDER III. ALGÆ, Flags. The plants comprehended under this order have their root, ſtem, and leaf all in one. The characters of the fructification of this order are not yet known, excepting the few deſcriptions given by Michelius. The genera are twelve, viz. *Jungermannia*, *Targionia*, *Marchantia*, *Blaſia*, *Riccia*, Marſh Liverwort, *Anthoceros*, *Lichen*, Liverwort, *Tremella*, *Fucus* Wrack, or Sea Weed, *Ulva*, Laver, *Conferva*, and *Byſſus*.

ORDER IV. FUNGI, Muſhrooms. The genera of this order are given by Linnæus after the method of Dillenius. The fructification being imperfectly known, no character can be aſſigned for this order, farther than the title, which is familiar to every one. The genera are ten, viz. *Agaricus*, Agaric, *Boletus*, *Hydnum*, *Phallus*, Stinkhorns, *Clathrus*, *Helvella*, *Peziza*, Cup Muſhroom, *Clavaria*, *Lycoperdon*, and *Mucor*.

Twenty-fifth Claſs, PALMÆ, comprehending ſuch plants as have a ſpadax and ſpatha. This order contains nine genera, viz. *Chamærops*, Dwarf Palm, or Palmetto, *Boraſſus*, *Corypha*, *Cocos*, Cocoa Nut, *Phœnix*, Common Palm, or Date Palm Tree, *Elais*, *Areca*, Arica Nut, *Elate*, and *Caryota*.

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[*] A Veil.

From this ſhort ſketch of the ſcience of Botany, it will be eaſily ſeen in what manner it is applied, in order to diſcover the genus and ſpecies of any unknown plant. When a plant is gathered in flower, the number of the ſtamina will refer to the CLASS, and the piſtils to the ORDER, except in the twelve laſt claſſes, which are diſtinguiſhed by other marks. When the order is found, the GENUS is next to be diſcovered, which is done by obſerving the calyx, the *corolla*, the *pericarpium*, and the *ſeeds*, as well as the form and ſituation of the *ſtamina* and *piſtils*. The SPECIES are diſtinguiſhed by ſome ſpecific difference of the root, the trunk, the branches, or the leaves, and they are called by ſome trivial name, expreſſive of the ſpecific difference, or ſome other circumſtance; thus we find the *yellow* gentian, the *leſſer* centaury, the *rough-leaved*, and the *ſmooth-leaved* witch elms, &c. It is evident, that in ſuch a work as this, it is barely poſſible to preſerve the names of the different genera; for thoſe who wiſh to proceed in the ſcience, and to know their deſcription, as well as ſpecific differences, we muſt be content with recommending the *Syſtema*, *genera*, and *Species plantarum* of Linnæus, or the *Families of the Plants*, publiſhed by the Litchfield Society. Or for a further introduction to the ſcience (if that be neceſſary) there cannot be a more elegant elementary book, than Profeſſor Martyn's Letters on Botany.

Vegetables, according to their natural order, are diviſible into the ſeven families or tribes following, viz.

1. FUNGI, Muſhrooms.
2. ALGÆ, Flags; whoſe root, leaf, and ſtem are all one.
3. MUSCI, Moſſes; whoſe antheræ have no filaments, and are placed at a diſtance from the female flower, and whoſe ſeeds alſo want their proper tunic and cotyledons.
4. FILICES, Ferns; whoſe fructification is on the back of the frondes.
5. GRAMINA, Graſſes; which have ſimple leaves, a jointed culm or ſtem, a glumoſe calyx, and a ſingle ſeed.
6. PALMÆ, Palms; which have ſimple ſtems that are frondoſe at the ſummit, and have their fructification on a ſpadix iſſuing from a ſpatha.

7. PLANTS, which include all that do not enter into any of the other diviſions. Theſe are,

Herbaceous, when they die down to the root every year; for in the perennial kinds, the buds are all produced on the root below the ſurface of the ground.

Shrubs, when their ſtems come up without buds.

And *Trees*, when their ſtems come up with buds.

It is impoſſible to finiſh our ſhort review of nature, without obſerving the wonderful harmony and connection that ſubſiſts between all the different branches; without obſerving how happily one part ſupports another, and how every thing contributes to the general good. How infinitely great muſt be that ETERNAL MIND who framed all with ſuch amazing ſkill. Who ſees, with a ſingle glance, the operation and mechaniſm of the whole, from the minute anatomy of the ant, from the almoſt inconſpicuous vegetation of the various tribe of moſſes, to thoſe innumerable worlds, thoſe vaſt and ſplendid orbs, that gild the unbounded expanſe of the univerſe.

FINIS.

A GLOS-

A
GLOSSARY;
EXPLAINING THE
TECHNICAL TERMS
IN
BOTANY:
IN ALPHABETICAL ORDER,

By conſulting which any Book of Botany may eaſily be underſtood.

A

ABBREVIATUM *perianthium*, ſhortened, when the cup is ſhorter than the tube of the flower.

Abortiens *flos*, barren flowers, ſuch as produce no fruit.

Abruptum *folium pinnatum*, winged leaves, ending without either foliole or cirrhus.

Acaulis, without ſtalk or ſtem.

Aceroſum *folium*, chaffy leaves, when they are linear and abiding, as in Pinus, Abies, and Juniperus.

Acicularis, needle-ſhaped, as in ſcirpus acicularis.

Acinaciforme, falchion or ſcimitar-ſhaped, as in meſembry-anthemum acinaciforme.

Acini, the ſmall berries which compoſe the fruit of a mulberry or bramble.

Acotyledones, plants, whoſe ſeeds have no cotyledons or ſeminal leaves.

Aculei, prickles, fixed in the rind or ſurface of the bark.

Aculeatus *caulis*, a ſtalk or ſtem furniſhed with prickles.

Acuminatum *folium*, a leaf ending in a point.

Acutum *folium*, leaves terminating in an acute angle.

Adnatum *folium*, the diſk of the leaf preſſing cloſe to the ſtem of the plant.

Adpreſſa *folia*, the diſk of the leaf preſſed towards the ſtem.

Adſcendens *caulis*, a ſtalk or branch inclining upwards.

Adverſum *folium*, when the ſides of the leaf are turned towards the ſouth.

Aggregatus *flos*, an aſſemblage of flowers coming in cluſters.

Aggregatæ, an order of plants in the fragmenta methodi naturalis of Linnæus.

Ala, a wing, the ſide petals of a papilionaceous bloſſom, or a membrane added to a ſeed, ſtalk, &c.

Alatus *petiolus*, when the foot-ſtalk of a leaf is winged with membranes.

Alburnum, the white ſubſtance that lies between the inner bark and the wood of trees,

Algæ, flags, one of the ſeven families of plants.

Alterni rami *folia*, when they come out ſingly, and follow in gradual order.

Amentaceæ, an order of plants in the fragmenta methodi naturalis of Linnæus, bearing catkins.

Amentum, a catkin.

Amplexicaule *folium*, embracing the ſtalk when the baſe of the leaf embraces the ſtem ſideways.

Anceps *caulis*, double-edged, when a ſtalk is compreſſed, and forms two oppoſite acute angles.

Androgyna, plants bearing male and female flowers on the ſame root.

Angulatus *caulis*, angulated ſtalks.

Anguſtifolia, narrow leaved.

Angioſpermia, the ſecond order in the claſs didynamia of Linnæus; containing plants whoſe ſeeds are covered with a capſule.

Annua *radix*, an annual root; that which lives but one year.

Anthera, the ſummit of the ſtamina bearing the pollen, and is a part of the principal male organ of generation.

Apertura, an aperture, opening in ſome ſpecies of anthera.

Apetalus *flos*, having no petals or corolla.

Apex, the top or ſummit.

Aphyllus *caulis*, deſtitute of leaves.

Apophyſis, an excreſcence from the receptacle of the muſci.

Appendiculatus *petiolus*, a little appendage hanging from the extremity of the foot-ſtalk.

Aproximata *folia*, leaves growing near each other.

Arbor, a tree.

Arbuſtiva, a copſe of ſhrubs or trees, an order of plants in the fragmenta methodi naturalis of Linnæus.

Arcuatum *legumen*, arched, a pod that is curved or bent.

Arillus, the proper exterior coat of a ſeed that falls off ſpontaneouſly.

Ariſta, the beard of corn or graſſes.

Arma, arms, weapons, one of the ſeven kinds of fulcra of plants.

Articulatus *caulis*, culmus, having knots or joints.

Articulus *culmi*, the ſtraight part of the ſtalk between the two joints.

Aſperifolia, rough-leaved plants, an order of plants in the fragmenta methodi naturalis of Linnæus.

Aſſurgentia *folia*, firſt bent down, but riſing erect towards the apex.

Attenuatus *pedunculus*, when the foot-ſtalk grows ſmaller towards the flower.

Auctus *calyx*, augmented, having a ſeries of diſtinct leaves, ſhorter than its own, that ſurround its baſe.

Avenia *folia*, leaves which have no viſible veins.

Auriculatum *folium*, an ear-ſhaped leaf, when the leaf towards the baſe has a lobe on each ſide.

Axillaria *folia*, growing out of the angles formed by the branches and the ſtem.

B

Bacca, a berry; or a pulpy pericarpium without valves, in which the ſeeds are naked.

Barba, a beard, a ſpecies of pubeſcence, ſometimes on the leaves of plants, as on the meſembryanthemum barbatum.

Barbatum *folium*, when a bunch of ſtrong hairs terminate the leaves.

Bicornes, plants, whoſe antheræ have the appearance of two horns. Likewiſe an order of plants in the fragmenta methodi naturalis of Linnæus.

Biennis *radix*, a root which continues to vegetate two years.

Bifaria *folia*, a leaf pointing two ways.

Biferæ *plantæ*, flowering twice a year.

Bifidum *folium*, divided or cloven into two parts.

Biflorus *pedunculus*, bearing two flowers on a foot-ſtalk.

Bigeminum *folium*, a forked foot-ſtalk, with two little leaves on the apex of each diviſion.

Bijugum *folium*, a winged leaf, bearing two pair of foliola.

Bilabiata *corolla*, a corolla with two lips.

Bilobum *folium*, a leaf conſiſting of two lobes.

Binata *folia*, a digitate leaf, conſiſting of two foliola.

Bipartitum *folium*, a leaf divided into two ſegments.

Bipinnatum *folium*, doubly winged, when the folioles of a pinnate leaf are pinnate.

Biternatum *folium*, where there are three folioles on a petiole, and each foliole is ternate; as in epimedium.

Bivalve *pericarpium*, conſiſting of two valves, as in the ſiliqua and legumen.

Brachiatus *caulis*, branching in pairs; each pair ſtanding at right angles with thoſe above and below.

Brachium, the arm, tenth degree in the Linnæan ſcale for meaſuring plants, being twenty-four Pariſian inches.

Bractæa, a floral leaf, theſe are generally of a different ſhape and colour from the other leaves of the plant, and are always ſeated near the fructification.

Bracteatus, having a bractea growing out of it.

Bulbiferus *caulis,* a ſtalk bearing bulbs, as in a ſpecies called lilium bulbiferum.

Bulboſa *radix,* a bulbous root, and is either ſquamoſa, ſcaly, as in lilium; tunicata, coated, as in cepæ; duplicate, double, as in fritillaria; or ſolida, as in tulipa.

Bullatum *folium,* when the ſurface of the leaf riſes above veins, ſo as to appear like bliſters.

C

Caducus *calyx,* to fall off; a term ſignifying the ſhorteſt time of duration, falling off at the firſt opening of the flower.

Calamariæ, a reed, an order of plants in the fragmenta methodi naturalis of Linnæus.

Calcariatum *nectarium,* a kind of nectarium reſembling a ſpur as in the delphinium.

Caliculatus *calyx,* a little calyx added to a larger one, as in the coreopſis, leontice, &c.

Calycanthemi, a calyx, an order of plants in the fragmenta methodi naturalis of Linnæus.

Calyptra, a veil, in moſſes, where it is placed over the antheræ.

Calyx, a flower cup, of which there are the following kinds, viz. perianthium, involucrum, amentum, ſpatha, gluma, calyptra, and volva.

Campanacei, an order of plants in the fragmenta methodi naturalis of Linnæus.

Campanulata *corolla,* bell-ſhaped flowers.

Canaliculatum *folium,* leaves having a deep channel running from the baſe to the apex.

Candelares, an order of plants in the fragmenta methodi naturalis of Linnæus.

Capillaceum *folium,* capillary, exemplified in the ranunculus aquatilis.

Capillaris *pappus,* hairy down, as in hieracium, and ſonchus.

Capillus, hair, the firſt degree of the Linnæan ſcale for meaſuring plants, the diameter of a hair, and the twelfth part of a line.

Capitati *flores,* flowers collected into heads, as in mentha aquatica, and thymus ſerpyllum.

Capitulum, a little head, a ſpecies of infloreſcentia, in which the flowers are connected into cloſe heads on the tops of the peduncles, as in gomphrena.

Capreolus, a tendril, ſee cirrhus.

Capſula, a capſule, a hollow pericarpium, which cleaves or parts in ſome determinate manner, and conſiſts of valvula diſſepimentum, columella, and loculamentum.

Carina, the keel of a boat or ſhip, the lower petal of the papilionaceous corolla.

Carinatum *folium*, when the back of a leaf reſembles the keel of a ſhip.

Cariophyllæus *flos*, clove-tree, or flowers growing in the manner of carnations.

Carnoſum *folium*, a fleſhy leaf, as in ſedum daſyphillum.

Cartilagineum *folium*, a leaf whoſe brim is furniſhed with a margin of different ſubſtance from the diſk.

Caryophylli, carnations or pinks, an order of plants in the fragmenta methodi naturalis of Linnæus.

Catenulata *ſcabrities*, ſpecies of glandular roughneſs, hardly viſible to the naked eye, reſembling little chains on the ſurface of ſome plants.

Caudex, the ſtem of a tree.

Caulеſcens, having a ſtalk or ſtem.

Caulina *folia*, leaves growing immediately on the ſtem.

Caulis, a ſtem, a ſpecies of truncus.

Cernuus, nodding or hanging down its head.

Ceſpitoſa, plants which produce many ſtems from one root, and form a ſurface of turf or ſod.

Ciliatum, whoſe margin is guarded by parallel briſtles, formed like the eye-laſh.

Circinalea *folia*, a hoop or ring, a term of foliation, expreſſive of the leaves within the gemma, being rolled ſpirally downward.

Circumſciſſa *capſula*, cut tranſverſely, as in anagallis.

Cirrhiferus *pedunculis*, a peduncle bearing a tendril, as in vitis.

Cirrhoſum *folium*, a leaf that terminates in a tendril, as in glorioſa.

Cirrhus, a claſper, or tendril, one of the fulcra of plants.

Claſſis, a claſs, is defined by Linnæus to be an agreement of ſeveral genera in the parts of fructification, according to the principles of nature diſtinguiſhed by art.

Clavatus *petiolus*, *pedunculus*, when the foot-ſtalk of the leaf or flower is club-ſhaped, tapering from the baſe to its apex.

Clavicula, a little key, a tendril.

Clauſa *corolla*, when the neck of the corolla is cloſe ſhut in with valves.

Coadunatæ, to gather together, an order of plants in the fragmenta methodi naturalis of Linnæus.

Coarctati *rami*, cloſe together, oppoſed to divaricatus.

Cochleatum *legumen*, a pod like the ſhell of a ſnail, as in medicago.

Coloratum *folium*, coloured, when leaves which are generally green, are of a different colour.

Columnella, a little column, the ſubſtance that paſſes through the capſule, and connects the ſeveral partitions and ſeeds.

Columniferi, pillar-ſhaped, an order of plants in the fragmenta methodi naturalis of Linnæus.

Coma, a buſh, or head of hair, a ſpecies of fulcra, compoſed of large bractæ, which terminates the ſtalk, as in lavandula, ſalvia, &c.

Communis *gemma*, regards the contents of the gemma, containing both flower and fruit.

Communis *calyx*, when a cup contains both receptacle and flower.

Comoſæ, a head of hair, an order of plants in the fragmenta methodi naturalis of Linnæus.

Comoſa *radix*, the fibres which put forth at the baſe of a bulbous root, reſembling a head of hair.

Compactum *folium*, when the leaf is of a compact and ſolid ſubſtance.

Completus *flos*, having a perianthium and corolla.

Compoſitus *caulis*, a compound ſtem, diminiſhing as they aſcend.

Compoſitum *folium*, when the petiole bears more than one leaf, of which are the following ſpecies, viz. articulatum, digitatum, conjugatum, pedatum, pinnatum decompoſitum, ſupra-decompoſitum.

Compoſiti, an order of plants in the fragmenta methodi naturalis of Linnæus.

Compreſſus *caulis*, *folium*, a leaf reſembling a cylinder compreſſed on the oppoſite ſides.

Concavum *folium*, hollowed, the margin forms an arch with the diſk.

Conceptaculum, conceptacle or receiver, a pericarpium of a ſingle valve, which opens on the ſide lengthways, and has not the ſeeds faſtened to it.

Conduplicatum *folium*, doubled together, when the ſides of the leaf are parallel, and approach each other.

Conferti *rami*, branches crowded together.

Confertus *verticillus flos*, *et folia*, when flowers and leaves are formed into whorles round the ſtalk, and are crowded together.

Confluentia *folia*, to flow together, as in the pinnated leaf, when the pinnæ run into one another.

Conglobatus *flos*, when flowers are collected into globular heads.

Conglomeratus *flos*, flowers irregularly crowded together.

Congeſta *umbella*, flowers collected into a ſpherical ſhape, as in the allium.

Conica *ſcabrities*, a ſpecies of cetaceous ſcabrities, ſcarce viſible to the naked eye, on the ſurface of plants, formed like cones.

Coniferæ, plants bearing cones, ſuch as pinus, cupreſſus, &c. an order of plants in the fragmenta methodi naturalis of Linnæus.

Conjugatum, to join or couple together, a ſpecies of pinnate leaf, where the folioles come by pairs.

Connatum, to grow together, when two oppoſite leaves unite at their baſe, ſo as to have the appearance of one leaf.

Connivens *corolla,* when the apices of the petals converge, ſo as to cloſe the flower, as in Trollius Europæus.

Conniventes *antheræ,* approaching or inclining together.

Continuatum *folium,* continued, when the leaf appears to be a continuation of the ſubſtance of the ſtalk.

Contorti, to twiſt, an order of plants in the fragmenta methodi naturalis of Linnæus.

Contrariæ *valvulæ,* valves are termed contraria, when the diſſepimentum is placed tranſverſely between them.

Convexum *folium,* a leaf riſing from the margin to the centre of the leaf.

Convolutus *cirrhus,* a tendril twining with the ſame direction with the ſun's motion.

Convolutum *folium,* a term in foliation, when the leaf is rolled up like a ſcroll of paper.

Conus, ſee ſtrobilus.

Corculum, the heart and eſſence of the ſeed.

Cordatum *folium,* the heart-ſhaped leaf.

Cordiformus, ſhaped like a heart.

Corolla, a wreath or crown, one of the ſeven parts of fructification.

Corollula, a little corolla.

Corona *ſeminis,* a crown adhering to many kinds of ſeeds ſerving them as wings, which enables them to diſperſe.

Coronariæ, an order of plants in the fragmenta methodi naturalis of Linnæus.

Coronula, a little crown.

Cortex, the outer rind or bark of vegetables.

Corydales, an order of plants in the fragmenta methodi naturalis of Linnæus.

Corymbus is a kind of ſpike, the flowers of which have each its proper pedicellus, or partial foot-ſtalk raiſed to a proportional height, as in ſpirea opulifolia.

Cotyledon, a ſide-lobe of the ſeed, of a porous ſubſtance, and periſhable, or ſeminal leaves.

Crenatum *folium,* a notched leaf, when the margin is cut into angles that point towards neither of the extremities, obtuſely crenate, when the angles are rounded, or acutely crenate, when the angles are pointed.

Criſpum *folium,* a curled leaf, when the circumference becomes larger than the diſk admits of.

Criſtatus *flos,* when the flower has a tufted creſt, as in polygala.

Cruciformes *flores,* croſs-ſhaped flowers, conſiſting of four petals, diſpoſed in the form of a croſs, as in the claſs tetradinamia of Linnæus.

Cryptogamia, hidden marriages, the twenty-fourth claſs of the Linnæan ſyſtem.

Cubitus, a cubit, the ninth degree of the Linnæan ſcale for meaſuring plants, from the elbow to the extremity of the middle finger or ſeventeen Pariſian inches.

Cucullatum *folium*, leaves rolled up lengthways, in form of a cone, as in geranium cucullatum, &c.

Cucurbitaceæ, gourds, an order of plants in the fragmenta methodi naturalis of Linnæus.

Culminiæ, the top or crown of any thing, an order of plants in the fragmenta methodi naturalis of Linnæus.

Culmus, a reed or ſtraw, the proper ſtem or trunk of a graſs.

Cuſpidatum *folium*, a leaf whoſe apex reſembles the point of a ſpear or lance.

Cuneiforme *folium*, a wedge-ſhaped leaf.

Cyathiformis *corolla*, flowers of the form of a cup.

Cylindracea *ſpica*, a ſpike of flowers in form of a cylinder.

Cyma, that runs into long faſtigiate peduncles, proceeding from the ſame univerſal centre, but with irregular partial ones.

Cymoſus *flos*, ſee cyma.

Cymoſæ, an order of plants in the fragmenta methodi naturalis of Linnæus.

D

Dædaleum *folium*, a leaf whoſe texture is remarkably beautiful and exquiſitely wrought.

Debilis *caulis*, a weak, feeble ſtalk.

Decagynia, ten females, the fifth order in the tenth claſs ; flowers that have ten ſtyli.

Decandria, ten males, the tenth claſs of Linnæus.

Decaphyllus *calyx*, a calyx conſiſting of ten leaves.

Deciduum *folium*, leaves that fall off in winter.

Declinatus *caulis*, a ſtalk bending towards the earth.

Decompoſita *folia*, whem a petiole once divided connects many folioles.

Decumbens, to lie down.

Decurrens *folium*, running down, when the baſe of a ſeſſile leaf extends itſelf downwards along the ſtem, beyond the proper baſe or termination of the leaf.

Decurſive *folium pinnatum*, when the baſes of the foliole are continued along the ſides of the petiolus.

Decuſſata *folia*, to divide, when leaves grow in pairs, and oppoſite, each pair being oppoſite alternately.

Deflexus *ramus*, a branch bent a little downwards.

Deflorata *ſtamina*, having ſhed or diſcharged the farina fecundans.

Defoliatio, the time in autumn when plants ſhed their leaves.

Deltoides *folium*, a leaf formed like the Greek delta, as in meſembryanthemum deltoides.

Demerſum *folium*, in aquatic plants, leaves ſunk below the ſurface of the water.

Dendroides *ſurculus*, ſhrub-like, a ſubdiviſion of the ſurculus in the genus hypnum.

Dentatum *folium*, leaves having horizontal points of the ſame conſiſtence of the leaf, and ſtanding at a little diſtance from each other.

Denudatæ, to be ſtripped naked, an order of plants in the fragmenta methodi naturalis of Linnæus.

Dependens *folium*, to hang down, leaves pointing towards the ground.

Depreſſum *folium*, preſſed down, when the ſides riſe higher than the diſk.

Diadelphia, two brotherhoods, the ſeventeenth claſs in the ſexual ſyſtem.

Diandria, two males, the ſecond claſs in the ſexual ſyſtem.

Dichotomus *caulis*, forked ſtalks, when the diviſions come by two and two.

Dicotyledones, when the ſeeds have two cotyledons that are the placenta of the embryo plant, and afterwards the ſeed leaves.

Didyma *anthera*, twins, when anthera come by twos on each filament.

Didynamia, the ſuperiority of two, the fourteenth claſs in the ſexual ſyſtem.

Difformia *folia*, different forms, when leaves on the ſame plant come of different forms.

Diffuſus *caulis*, when the branches of the ſtalk ſpread different ways.

Digitatum *folium*, fingered, when the apex of a petiole connects many folioles.

Digynia, two females, the ſecond order in each of the firſt thirteen claſſes, except the ninth.

Dimidiatum, halved.

Dioecia, the twenty-ſecond claſs in the ſexual ſyſtem.

Dipetala *corolla*, flowers conſiſting of two petals, as in circæa, and commelina.

Diphyllus *calyx*, a calyx conſiſting of two leaves, as in the papaver, and fumaria.

Diſcus, a diſk, the middle part of a radiate compound flower.

Diſperma, plants producing their ſeeds by twos, as in the umbellatæ.

Diſſectum *folium*, leaves cut into lacinia, or diviſions.

Diſſepimentum, partitions of the fruit, which divide the pericarpium into cells.

Diſſiliens *ſiliqua*, pods that burſt with elaſticity.

Diſtans *verticillus*, when the whorles of flowers, in verticillate plan, ſtand at a great diſtance from one another.

Diſticha *folia*, in two rows, when leaves all reſpect two ſides of the branches only.

Divaricati *rami*, branches ſtanding wide from each other in different directions.

Divergentes *rami*, widening gradually.

Dodecandria, twelve males, the eleventh claſs in the ſexual ſyſtem.

Dodrans, the ſeventh degree in the Linnæan ſcale for meaſuring the parts of plants, or nine Pariſian inches.

Dodrantalis, nine inches.

Dolabriforme *folium*, a leaf reſembling an ax, as in meſembryanthemum dolabriforme.

Dorſalis *ariſta*, an awne or beard, fixed to the back, or external part of the gluma.

Drupa, a pulpy pericarpium, without valves, containing a ſtone, as in the plum and peach.

Drupaceæ, an order of plants in the fragmenta methodi naturalis of Linnæus.

Dumoſæ, a buſh, an order of plants in the fragmenta methodi naturalis of Linnæus.

Duplica *radix*, a double root, a ſpecies of bulbous root, conſiſting of two ſolid bulbs, as in ſome ſpecies of orchis.

Duplicato *ſerratum folium*, ſawed double, with leſſer teeth within the greater.

E

Ebracteatus *racemus*, without a bractea, or floral leaf.

Ecaudata *corolla*, without a tail or ſpur, as in antirrhinum, cymbalaria.

Echinatum *pericarpium*, pods beſet with prickles, like a hedgehog.

Effloreſcentia, the preciſe time when a plant ſhews its firſt flowers.

Emarginatum *folium*, when the apex of a leaf terminates in a notch; the ſame may be applied to petala, and ſtigma.

Enervium *folium*, leaves having no apparent nerves.

Enneandria, nine males, the ninth claſs in the ſexual ſyſtem.

Enneapetala *corolla*, a flower conſiſting of nine petals.

Enodis *caulis*, *culmis*, ſtalks and ſtraws, having no knots or joints.

Enſatæ, plants having ſword-ſhaped leaves, an order of plants in the fragmenta methodi naturalis of Linnæus.

Enſiforme *folium*, leaves ſhaped like a two-edged ſword, tapering towards the point.

Equitantia *folia*, riding, when the ſides of the leaves approach in ſuch a manner as the outer embrace the inner.

Erectus *caulis*, *ramus*, *folium*, upright, perpendicular.

Eroſum *folium*, gnawed, when the leaf is ſinuate, and the margin appears as if it were gnawed or bitten.

Exſerta *ſtamina,* ſtanding forth, when the ſtamina appear above the corolla.

Exſtipulatus, without ſtipulæ.

Exſuccum *folium,* when the ſubſtance of the leaf is dry.

Extrafoliaceæ *ſtipulæ,* ſtipula, growing on the outſide of the leaves.

F

Farctum *folium,* ſtuffed, oppoſed to tubuloſum.

Faſciculata *folia,* bundled, leaves growing in bunches.

Faſcicularis *radix,* bundled, tuberous roots growing in bundles.

Faſciata *planta,* when many ſtalks grow together, like a faggot or bundle.

Faſtigiati *pedunculi,* pedunculi pointed at the apex.

Fauces, the jaws or chops.

Femina *planta,* a plant bearing female flowers on the ſame root only.

Fibroſa *radix,* a fibrous root.

Filamentum, a thread, applied to the thread-like part of the ſtamina.

Filices, ferns, one of the ſeven diviſions of the vegetable kingdom, and an order of plants in the fragmenta methodi naturalis of Linnæus.

Filiform *filamentum,* thread-ſhaped ſtamina.

Fimbricata *petala,* a fringed petal, as in menyanthus.

Fiſſum *folium,* a leaf ſplit or cloven half way down.

Fiſtuloſus *caulis,* a piped or hollow ſtem.

Flabellatum *folium,* a fan-ſhaped leaf.

Flaccidus *pedunculus,* the foot-ſtalk of a flower that is feeble and ſlender.

Flagellum, a twig, or ſhoot, like a whip or thong.

Flexuoſus *caulis,* a ſtalk having many turnings or bendings, taking a different direction at every joint.

Floralia *folia,* floral leaves that immediately attend the flower.

Floralis *gemma,* flower buds.

Flos, a flower.

Floſculus, a little flower.

Foliaceæ, *glandulæ,* glands growing on the leaves.

Foliaris *cirrhus,* a tendril growing from a leaf.

Foliaris *gemmatio,* leaf-buds.

Foliatio *plantæ,* the complication of the leaves, whilſt folded within the gemma, or bud.

Foliatus *caulis,* a leafy ſtalk.

Foliifera *gemma,* a bud producing leaves.

Foliolum, a little leaf, one of the ſingle leaves, which together conſtitute a compound leaf.

Folioſum *capitulum,* covered with leaves amongſt the flowers or tops of the plant.

Folium, a leaf.

Fornicatum *petalum*, vaulted or arched, as in the upper lip of the flowers in the claſs didynamia.

Frequens *planta*, plants growing frequently, or commonly, every where.

Frondeſcentia, the ſeaſon of the year when the leaves of plants are unfolded.

Frondoſus *cordex*, a ſpecies of trunk compoſed of a branch and a leaf blended together, as is frequently united with the fructification.

Fructeſcentia, the time of the year when a plant ſcatters its ripe ſeeds.

Fructificatio, the temporary part of a vegetable appropriated to generation, terminating the old vegetable, and beginning the new.

Fruſtranea *polygamia*, to no purpoſe, the third order of the claſs ſyngeneſia.

Frutex, a ſhrub.

Fruticoſus *caulis*, a ſhrubby ſtalk.

Fugaciſſima *petala*, petals that are fleeting, and of ſhort duration.

Fulcratus *caulis*, branches having props, ſee fulcrum.

Fulcrum, a prop or ſupport.

Fungi, a kind of muſhroom, one of the ſeven families of plants, an order of plants in the fragmenta methodi naturalis of Linnæus.

Furcata, forked.

Fuſiform *radix*, a ſpindle-ſhaped root.

G

Galea, a helmet, applied to the corolla of the claſs gynandria, as in orchis.

Galeatum *labium*, the lip of a flower, ſhaped like a helmet.

Geminæ *ſtipulæ*, ſtipula growing in pairs.

Geminatus *pedunculus*, double foot-ſtalks growing from the ſame point.

Gemma, a bud, an hibernaculum on the aſcending caudex.

Gemmatio, a young bud.

Gemmiparus, bearing buds.

Genera *plantarum*, genera of plants, the ſecond ſubdiviſion in the Linnæan ſyſtem; it comprehends an aſſemblage of ſpecies, ſimilar in their parts of fructification, under the ſame claſs and order.

Geniculatus, *caulis*, *culmus*, *pedunculus*, a jointed ſtalk, ſtraw, or foot-ſtalk of a flower.

Genicula, little joints.

Germen, a ſprout or bud, the baſe of the piſtillum, the rudiment of the fruit yet in embryo.

Gibbum *folium*, bunching out, or gouty.

Glaber, ſmooth, having an even ſurface.

Gladiata *ſiliqua*, a ſword-ſhaped pod.

Glandulæ, a gland, or ſecretory veſſel.

Glandulifera *ſcabrities*, a kind of briſtly roughneſs on the ſurface of ſome plants, on which there are minute glands at the extremity of each briſtle.

Glareoſis *locis*, gravelly places, where plants delight in gravel.

Glaucophyllus, a blueiſh, or azure-coloured leaf.

Globoſo *radix*, a round root.

Globularis *ſcabrities*, a ſpecies of glandular roughneſs, ſcarce viſible to the naked eye, the ſmall grains of which are exactly globular.

Glochoides, the ſmall points of the pubes of plants. Linnæus applies this term only to the hami triglochoids, with three hooked points.

Glomerata *ſpica*, flowers crowded together in a globular form.

Gluma, a huſk, or chaff, a ſpecies of calyx peculiar to corn and graſſes.

Glutinoſitas, like glue or paſte.

Gramina, graſſes, one of the ſeven families of the vegetable kingdom.

Granulata *radix*, roots conſiſting of many little knobs, like ſeeds or grain, attached to one another by ſmall ſtrings, as in ſaxifraga granulata.

Gymnoſpermia, naked ſeeded, the firſt order of the claſs didynamia.

Gynandria, when the male and female parts are joined together, the twentieth claſs in the Linnæan ſyſtem.

H

Habitualis *character*, the character or deſcription of a plant, taken from its habit, which conſiſts in the placentatio, radicatio, ramiſicatio, foliatio, ſtipulatio, pubeſcentia, infloreſcentia.

Habitus, the external appearance; Linnæus defines it, the conformity or affinity that the congeners of vegetables have to one another, in placentation, radification, &c.

Hamoſa *ſeta*, hooked briſtles.

Haſtatum *folium*, leaves reſembling the head of a ſpear or halbert.

Hemiſphericus *calyx*, half round, or half a ſphere.

Heptandria, ſeven males, the ſeventh claſs of the ſexual ſyſtem.

Herba, an herb; according to Linnæus, it is the part of the vegetable which ariſes from the root; it is terminated by the fructification, and comprehends the ſtem, leaf, props, and hibernacula.

Herbaceæ *plantæ*, are perennial plants, which annually periſh down to the root.

Herbaceus *caulis*, ſtalks that dry annually.

Hermaphroditus *flos*, flowers that contain both ſexes, as anthera and ſtigma.

Heſperidæ, an order of plants in the fragmenta methodi naturalis of Linnæus.

Hexagonus *caulis*, a ſtalk with ſix angles.

Hexandria, the ſixth claſs in the ſexual ſyſtem, which produce hermaphrodite flowers, with ſix ſtamina of equal length.

Hexagynia, an order of plants that produces ſix ſtyles.

Hexapetala *corolla*, flowers conſiſting of ſix petals.

Hexaphyllis *calyx*, a flower cup conſiſting of ſix leaves.

Hians *corolla*, a monopetalous flower that is gaping.

Hirſutus, rough, hairy.

Hiſpidus *caulis*, a ſtalk covered with ſtrong fragile briſtles.

Holeracea, pot herbs, an order of plants in the fragmenta methodi naturalis of Linnæus.

Horizontalis *flos*, flowers growing with their diſk parallel to the horizon.

Hibernaculum, winter-lodge, the part of a plant that incloſes and ſecures the embryo from external injuries.

Hybrida, a baſtard, a monſtrous production of two plants of different ſpecies, like the mule in the animal creation.

Hypocrateriformis *corolla*, a monopetalous flower ſhaped like a cup or ſalver.

I

Icoſandria, the twelfth claſs in the ſexual ſyſtem.

Imberbis *corolla*, a flower without a beard.

Imbricatus, tiled, when the ſcales of a ſtalk, or flower cup, lie over one another in the manner of tiles upon a houſe.

Immutatæ, unaltered.

Impar, odd, applied to a pinnated leaf terminating in an odd lobe.

Inequalis *corolla*, an unequal flower.

Inanis *caulis*, hollow or empty ſtalks.

Incanum *folium*, leaves covered with whitiſh down.

Inciſum *folium*, leaves cut into irregular ſegments.

Incompletus *flos*, imperfect flowers without petals.

Incraſſatus *pedunculus*, foot-ſtalks of flowers that increaſe in thickneſs as they approach the flowers.

Incumbens *anthera*, anthera which are affixed to the filament ſideways.

Incurvatus *caulis*, a ſtalk bowed towards the earth.

Indiviſum *folium*, an entire undivided leaf.

Inerme *folium*, unarmed, a leaf without briſtles or prickles.

Inferus *flos*, flowers whoſe receptacle are ſituated below the germen.

Inflatum *perianthium*, a calyx puffed out like a bladder.

Inflexa *folia*, to bend inwards towards the ſtem.

Infloreſcentia, infloreſcence, ſignifies the various modes in which flowers are joined to the plant by the pedunculus.

Infundibuliformis *corolla*, a monopetalous flower ſhaped like a funnel.

Inſertus *petiolus*, a foot-ſtalk inſerted into the ſtem.

Integrum *folium*, an entire or undivided leaf.

Integerrimum *folium*, an entire leaf, whoſe margin is deſtitute of inciſions or ſerratures.

Interfoliaceus *pedunculus*, flower-ſtalks ariſing from between oppoſite leaves.

Interruptum *folium pinnatum*, when the large folioles of a winged leaf are interrupted alternately by pairs of ſmaller ones.

Interrupta *ſpica*, a ſpike of flowers, interrupted or broken by ſmall cluſters of flowers between the larger ones.

Intorſio, writhing or twiſting.

Intrafoliaceæ *ſtipulæ*, ſtipulæ growing on the inſide of the leaves of the plant.

Inundata *loca*, this term is applied by Linnæus to ſuch places that are overflowed only in winter.

Involucellum, a partial involucrum.

Involucrum, a cover, the calyx of the umbelliferous plants ſtanding at a diſtance from the flower.

Involuta *folia*, rolled in leaves when their lateral margins are rolled ſpirally inwards on both ſides.

Irregularis *flos*, irregular flowers of deformed ſhapes.

Juba, a creſt of feathers.

Julus, a katkin.

L

Labiatus *flos*, a lipped flower.

Lacerum *folium*, a cleft or fiſſure, leaves whoſe margin is cut into ſegments, as if rent or torn.

Laciniæ, ſegments or inciſions.

Laciniatum *folium*, a leaf cut into irregular inciſions.

Lacteſcentia, milky; thoſe plants are called milky, whoſe juices are white, yellow, or red.

Lacunoſum *folium*, leaves that are deeply furrowed, by the veins being ſunk below the ſurface.

Lacuſtris *planta*, plants which grow in lakes of water.

Lamina, a thin plate, the upper expanded part of a polypetalous flower.

Lana, wool, a ſpecies of pubeſcence, which covers the ſurface of plants.

Lanatum *folium*, a woolly leaf.

Lanceolatum *folium,* a lance-ſhaped leaf.

Laterales *flores,* flowers coming from the ſides.

Laxus caulis, looſe, weak, ſlender.

Legumen, pulſe, a pericarpium of two valves, in which the ſeeds are fixed along one ſuture only.

Lenticularis *ſcabrities,* a ſpecies of glandular ſcabritis, in the form of lentils.

Leproſus, ſpotted like a leopard, exemplified in Lichen.

Lævis *caulis,* ſmooth, having an even ſurface.

Liber, the inner rind or bark of a plant.

Lignoſus *caulis,* a woody ſtem.

Lignum, wood.

Ligulatus *flos,* when the petals, tubulated at the baſe, are plane linear towards the middle, and wideſt at the extremity, in form of a bandage.

Liliaceæ, like a lily, an order of plants in the fragmenta methodi naturalis of Linnæus.

Limbus, a border, the upper expanded part of a monopetalous flower.

Linea, a line, the ſecond degree in the Linnæan ſcale for meaſuring plants, the twelfth part of an inch.

Lineare *folium,* a narrow leaf, whoſe oppoſite margins are almoſt parallel, as in pinus.

Lineatum *folium,* leaves whoſe ſuperficies are marked with parallel lines, running lengthways.

Lingulatum *folium,* a leaf ſhaped like a tongue.

Lobatum *folium,* when leaves are divided to the middle into parts that ſtand wide from each other, and have their margins convex.

Loculamentum, a cell, the diviſions of that ſpecies or pericarpium called a capſula.

Locus *foliorum,* the particular part of the plant to which the leaf is affixed,

Lomentaceæ, bean meal, an order of plants in the fragmenta methodi naturalis of Linnæus.

Longiuſculus, longiſh.

Longum *perianthium,* when the tube of the calyx is equal in length to that of the corollæ.

Lucidum *folium,* clear, ſhining.

Lunatum *folium,* moon-ſhaped leaves, when they are round and hollowed at the baſe like a half-moon.

Lunulate, ſhaped like a creſcent.

Luridæ, pale, wan, an order of plants in the fragmenta methodi naturalis of Linnæus.

Luxurians *flos,* a luxuriant flower.

Lyratum *folium,* leaves ſhaped like a harp or lyre.

M

Marceſcens *corolla,* flowers withering on the plant.
Margo *folii,* the margin or edge of the leaf.
Mas planta, male plants, ſee claſs dioecia.
Maſculus *flos,* male flowers, containing antheræ, but no ſtigma.
Medulla, marrow, the pith or heart of a plant.
Membranaceum *folium,* when leaves have no diſtinguiſhable pulp between their ſurfaces.
Membranatus *caulis,* a ſtalk covered with thick membranes.
Monadelphia, one brother, the ſixteenth clas in the ſexual ſyſtem.
Monandria, one male, the firſt claſs in the ſexual ſyſtem.
Monocotyledones, a term in placentation, aplied to plants whoſe ſeed have a ſingle cotyledon.
Monoecia, one houſe, the twenty-firſt claſs in the ſexual ſyſtem,
Monogynia, one female, the firſt order of the firſt thirteen claſſes in the Linnæan ſyſtem.
Monopetala *corolla,* a flower having one petal.
Monophyllum *involucrum,* conſiſting of one leaf.
Monoſperma, having one ſeed.
Miliaris, *ſcabrities,* a ſpecies of glandular roughneſs appearing on the ſurface of ſome plants like grains of millet.
Mucronatum *folium,* a leaf terminating in a ſharp point.
Multifidum *folium,* a leaf divided into many linear ſegments, or diviſions.
Multiflorus *pedunculus,* a foot-ſtalk bearing many flowers.
Multipartitum *folium,* a leaf divided into many parts.
Multiplicatus *flos,* a luxuriant flower, whoſe corolla is multiplied ſo as to exclude ſome of the ſtamina.
Multiſiliquæ, many pods, an order of plants in the fragmenta methodi naturalis of Linnæus.
Muricatus *caulis,* a ſtalk, whoſe ſurface is covered with ſharp points, like the murex ſhell.
Muricatæ, an order of plants in the fragmenta methodi naturalis of Linnæus.
Muſci, moſſes, one of the ſeven families in the vegetable kingdom, and an order of plants in the fragmenta methodi naturalis of Linnæus.
Mutica *gluma,* when the ariſta is wanting.
Mutilatus *flos,* a mutilated flower.

N

Natans *folium,* a leaf which ſwims on the ſurface of water.
Navicularis *valvula,* when the valve of a ſeed veſſel reſembles a ſhip.

Neceſſaria *polygamiæ*, neceſſary marriages, the fourth order of the nineteenth claſs in the ſexual ſyſtem.

Nectarium, that part of the corolla that contains the honey juice.

Nervoſum *folium*, leaves whoſe ſurface is full of nerves or ſtrings.

Nidulantia *ſemina baccarum*, ſeeds neſtling in the pulp of a berry.

Nitidum *folium*, a bright ſhining gloſſy leaf.

Nucamentaceæ, an order of plants in the fragmenta methodi naturalis of Linnæus.

Nucleus, a kernel.

Nudus *caulis*, a naked ſtalk.

Nutans *caulis*, a nodding ſtalk.

Nux, a nut.

O

Obcordatum *petalum*, a heart-ſhaped petal, with its apex downwards.

Obliquum *folium*, when the apex of the leaf points obliquely towards the horizon.

Oblongum *folium*, an oblong leaf.

Obſolete *lobatum folium*, leaves having lobes ſcarce diſcernible.

Obtuſum *folium*, leaves blunt or rounded at the apex.

Obvolutum *folium*, rolled againſt each other, when their reſpective margins alternately embrace the ſtraight margin of the oppoſite leaf.

Octandria, eight males, the eighth claſs in the ſexual ſyſtem.

Officinalis, plants uſed in medicine, and kept in the apothecaries ſhops.

Operculum, a cover, as in the moſſes.

Oppoſiti *rami folia*, branches and leaves that grow by pairs oppoſite each other.

Orbiculatum *folium*, round leaves.

Orchideæ *orchis*, an order of plants in the fragmenta methodi naturalis of Linnæus.

Ordo, order.

Orgya, a fathom, or ſix Pariſian feet.

Ovale *folium*, an oval leaf.

Ovalium, the germen.

Ovatum *folium*, an oval, or egg-ſhaped leaf.

P

Pagina *folii*, the ſurface of a leaf.

Palea, chaff, a thin membrane riſing from a common receptacle, which ſeparates the floſculi.

Paleaceus *pappus*, chaffy down.

Palmæ, palms, one of the ſeven families of the vegetable kingdom.

Palmata *radix*, a handed root, as in orchis.

Palmatum *folium*, a leaf ſhaped like an open hand.

Paluſtris, marſhy or fenny.

Panduriforme *folium*, ſhaped like a guitar, a muſical inſtrument ſo called.

Panicula, a panicle, or looſe ſpike of graſs.

Papilionaceus, butterfly-ſhaped flower, as in the claſs diadelphia of Linnæus.

Papilionaceæ, an order of plants in the fragmenta methodi naturalis of Linnæus.

Papiloſum *folium*, a nipple, a leaf covered with dots or points like nipples.

Pappus, down.

Papuloſum *folium*, a leaf whoſe ſurface is covered with pimples.

Parabolicum *folium*, a leaf in form of a parabola.

Parallelum *diſſepimentum*, when the diſſepiments are parallel to the ſides of the pericarpium.

Paraſitica *planta*, plants that grow only out of other plants, as the viſcum.

Partialis *umbella*, a partial umbel.

Partiale *involucrum*, when at the baſe of the partial umbel.

Partitum *folium*, a divided leaf.

Parvum *perianthium*, a little flower cup, or comparatively ſmall, oppoſed to magnum.

Patens *caulis*, *ramus*, &c. ſpreading ſtalks and branches.

Patulus *calyx*, a ſpreading cup.

Paucifloris, having few flowers.

Pedalis *caulis*, a ſtalk a foot in height.

Pedatum *folium*, a ſpecies of compound leaf, whoſe diviſions reſemble the toes of a foot, as in helleborus fœtida.

Pedicellus, a little foot-ſtalk.

Peduncularis *cirrhus*, a tendril proceeding from the foot-ſtalk of a flower.

Pedunculati *flores*, flowers growing on foot-ſtalks.

Pedunculus, the foot-ſtalk of a flower.

Peltatum *folium*, when the foot-ſtalk is inſerted into the diſk of the leaf, and not into its baſe.

Penicilliformia *ſtigmata*, a ſtigma in form of a painter's pencil.

Pentagonus, *caulis*, a five-angled ſtalk.

Pentagynia, five males, the fifth order of a claſs.

Pentandria, five males, the fifth claſs in the ſexual ſyſtem of Linnæus.

Pentapetala *coralla*, a flower conſiſting of five petals.

Pentaphyllus *calyx*, a calyx conſiſting of five leaves.

Perennis *radix*, a perennial root, continuing for many years.

Perfectus *flos*, flowers having petals, the perfect flowers of Ray, Tournefort, and other botaniſts.

Perfoliatum *folium*, when the baſe of the leaf entirely ſurrounds the ſtem, or when the ſtalk grows through the centre of the leaf, as in craſſula perfoliata.

Perforata *cotilydones*, to be pierced through, a ſpecies of the monocotyledones exemplified in the germina; alſo an order of plants in the fragmenta methodi naturalis of Linnæus.

Perianthium, a kind of calyx, ſo called when contiguous to the fructification.

Pericarpium, a ſpecies of pod that contains the ſeed.

Perichætium, a modification in the receptaculum in the muſci and algæ.

Perpendicularis *radix*, a perpendicular, or downright root.

Perſonatæ, maſked, an order of plants in the fragmenta methodi naturalis of Linnæus.

Pes, a foot.

Petaliformia *ſtigmata*, a ſtigma, reſembling the the ſhape of a petal.

Petalodes *flos*, a flower having petals.

Petalum, the corollaceous teguments of a flower.

Petiolaris *cirrhus*, a tendril proceeding from the foot-ſtalk of a leaf.

Petiolatum *folium*, a leaf growing on a foot ſtalk.

Petiolus, a little foot-ſtalk.

Pileus, a hat or bonnet, the orbicular expanſion of a muſhroom, which covers the fructification.

Pili, Hairs.

Piloſum *folium*, leaves whoſe ſurface is covered with long diſtinct hairs.

Pinnatifidum *folium*, (a winged leaf) applied to ſimple leaves whoſe laciniæ are tranſverſe to the rachiæ.

Pinnatum *folium*, a winged leaf.

Piperitæ, pepper, an order of plants in the fragmenta methodi naturalis of Linnæus.

Piſtillum, the ſtyle, or female organ of generation, whoſe office is to receive and ſecrete the farina fecundans.

Pixidatum *folium*, a kind of foliage, where one leaf is let in to another by a joint, as in equiſetum.

Placentatio *cotyledons*, of the ſeed.

Planipetalus *flos*, a flower with plain flat petals.

Plantæ, plants, one of the ſeven families of vegetables, comprehending all which are not included in the other ſix tribes.

Planum *folium*, plain flat leaves.

Plenus *flos*, a full or double flower.

Plicatum *folium*, a plaited leaf.

Plumata *ſeta*, a feathered hair or briſtle.

Plumoſus *pappus,* a kind of ſoft down.

Plumula, the aſcending ſcaly part of the corculum.

Pollen, meal, the prolific powder contained in the anthera.

Pollex, a thumb, the length of the firſt joint of the thumb, or a Pariſian inch.

Polyadelphia, many brotherhoods, the eighteenth claſs in the ſexual ſyſtem.

Polyandria, many males, the thirteenth claſs in the ſexual ſyſtem of Linnæus.

Polycotylidones, many cotyledons.

Polygamia, many marriages, the twenty-third claſs in the ſexual ſyſtem.

Polygynia, many females, an order of ſome of the claſſes in the ſexual ſyſtem.

Polypetala *corolla,* a flower conſiſting of many petals.

Polyphyllum *involucrum,* an involucrum of many leaves.

Pylyſtachius *culmus,* a ſtalk of graſs having many ſpikes.

Pomaceæ *pomum,* an apple, an order of plants in the fragmenta methodi naturalis of Linnæus.

Pomum, an apple.

Pori, pores.

Præmorſa *radix,* a bitten root, when it ends abruptly, as in ſcabioſa.

Preciæ, an order of plants in the fragmenta methodi naturalis of Linnæus.

Priſmaticus *calyx,* a triangular flower-cup.

Procumbens *caulis,* lying on the ground.

Prolifer *flos,* flowers growing through, or out of one another, either from the centre or ſide.

Prominulum *diſſipimentum,* to jet out beyond the valves.

Pronum *diſcum folii,* leaves having their face downwards.

Propago, a ſhoot, the ſeed of moſſes.

Proprium *involucrum,* an involucrum when at the baſe of an umbellated flower.

Pſeudo, a baſtard.

Pubes, down or hair, one of the ſeven kinds of fulcra.

Polpoſum *folium,* a leaf having a pulpy or fleſhy ſubſtance.

Pulveratum *folium,* a leaf powdered with a kind of duſt like meal, as in primula farinoſa.

Punctatum *folium,* a leaf ſprinkled with hollow dots or points.

Putamineæ, like a ſhell, an order of plants in the fragmenta methodi naturalis of Linnæus.

Q

Quadrangulare *folium,* a quadrangular leaf, having four prominent angles in the circumſcrption of its diſk.

Quadriſidum *folium*, a leaf divided into four parts.

Quadrijugum *folium*, a leaf having four pair of folioles.

Quadrilobum *folium*, a leaf conſiſting of four lobes.

Qquadripartitum *folium*, a leaf conſiſting of four diviſions down to the baſe.

Quaterna *folia*, when verticillate leaves come by fours, having four in each whorle.

Quina *folia*, verticillate leaves coming by fives.

Quinatum *folium*, when a digitate leaf has five folioles.

Quinquangulare *folium*, a leaf having five prominent angles in the circumſcription of the diſk.

Quinquejugum *folium*, when a pinnated leaf has five pair of folioles.

Quinquelobum *folium*, a leaf having five lobes.

Quinquefidum *folium*, a leaf conſiſting of five diviſions, with linear ſinuſes, and ſtraight margins.

Quinquepartitum *folium*, conſiſting of five divſiions down to the baſe.

R

Racemus, a bunch of grapes or currants, or any other bunch of berries that bears that reſemblance.

Rachis, the back bone, a ſpecies of receptaculum, as in the panicum.

Rachis *folii pinnati*, the middle rib of a winged leaf, to which the folioles are affixed.

Radiatus *flos*, a ſpecies of compound flowers, in which the florets of the diſk are tubular, and thoſe of the radius ligulate, as in the claſs ſyngeneſia.

Radicalia *folia*, leaves proceeding immediately from the root.

Radicans *caulis*, a ſtalk bending to the ground, and taking root where it touches the earth.

Radicatum *folium*, leaves ſhooting out roots.

Radicula, a little root.

Radius, a ray, the ligulate margin of the diſk of a compound flower.

Radix, a root.

Ramea *folia*, regards leaves that grow only on the branches, and not on the trunk.

Ramoſiſſimus *caulis*, ſtalks abounding with branches irregularly diſpoſed.

Ramus, a branch of a tree.

Ramoſus *caulis*, a ſtalk having many branches.

Receptaculum, a receptacle, the baſis on which the parts of fructification are connected.

Reclinatum *folium*, a leaf reclined or bending downward.

Recurvatum *folium*, a leaf bent backwards.

Reflexus *ramus*, a branch bent back towards the trunk.

Regularis *corolla*, a flower whoſe parts are regular in its figure and magnitude.

Remotus *verticillus*, when the whorles of flowers and leaves ſtand at a diſtance from one another.

Reniforme *folium*, a kidney-ſhaped leaf.

Repandum *folium*, a leaf having a bending or waved margin, without any angles.

Repens *radix*, a creeping root extending horizontally.

Repens *caulis*, a creeping ſtalk, either running along the ground, on trees, or rocks, and ſtriking roots at certain diſtances.

Reptans *flagellum*, creeping along the ground, as in fragaria.

Reſtantes *pedunculi*, foot-ſtalks remaining on, after the fructification has fallen off.

Reſupinatio *florum*, when the upper lip of the flower faces the ground, and the lower lip is turned upwards.

Reſupinatum *folium*, when the lower diſk of the leaf looks upward.

Retroflexus *ramus*, a branch bent in different directions.

Retrofractus *pedunculus*, bent backwards towards its inſertion, as if it were broken.

Retuſum *folium*, when the apex of the leaf is blunt.

Revolutum *folium*, a leaf rolled back.

Rhæades, the red poppy, an order of plants in the fragmenta methodi naturalis of Linnæus.

Rhombeum *folium*, a leaf whoſe ſhape nearly reſembles a rhombus.

Rhomboideum *folium*, a leaf of a geometrical figure, whoſe ſides and angles are unequal.

Rigidus *caulis folia*, ſtiff, hard, rigid.

Rimoſus *caulis*, abounding with clefts and chinks.

Ringens, grinning and gaping.

Roſaceus *flos*, a flower whoſe petals are placed in a circle, in form like thoſe of a roſe.

Roſtellum, a little beak, the deſcending plain part of the corculum of the ſeed

Rotaceæ, a wheel, an order of plants in the fragmenta methodi naturalis of Linnæus.

Rotatus *limbus*, *corolla*, a wheel-ſhaped flower, expanded horizontally, having a tubular baſis.

Rotundatum *folium*, a roundiſh leaf.

Rubra *lacteſcentia*, red milkineſs in plants.

Ruderata *loca*, rubbiſhy places.

Rugoſum *folium*, a rough or wrinkled leaf.

S

Sagittatum *folium*, an arrow-ſhaped leaf.

Sarmentaceæ, a twig or ſhoot of a vine, an order of plants in the fragmenta methodi naturalis of Linnæus.

Sarmentoſus *caulis*, the ſhoot of a vine, naked between each joint, and producing leaves at the joints.

Scaber *caulis, et folium*, ſcabby and rough, having tubercles.

Scabridæ, rough, an order of plants in the fragmenta methodi naturalis of Linnæus.

Scabrities, a ſpecies of pubeſcens, compoſed of particles ſcarce viſible to the naked eye, ſprinkled on the ſurface of plants.

Scandens *caulis*, a climbing ſtalk.

Scapus, a ſpecies of ſtalk which elevates the fructification, and not the leaves, as in narciſſus.

Scarioſum *folium*, leaves dry on the margin that ſound when touched.

Scitamina, fair, beautiful, an order of plants in the fragmenta methodi naturalis of Linnæus.

Scorpioides *flos*, a flover reſembling the tail of a ſcorpion.

Scutellum, a ſpecies of fructification which is orbicular, concave, and elevated in the margin, as in ſome ſpecies of lichen.

Scyphifer, cup-bearing, a ſubdiviſion of the genus lichen.

Secretoria *ſcabrities*, a ſpecies of glandular roughneſs on the ſurface of ſome plants.

Secunda *ſpica*, a ſpike of graſs with the flowers turned all towards one ſide.

Securiformis *pubeſcentia*, a ſpecies of pubes on the ſurface of ſome plants, the briſtles reſembling an axe or hatchet.

Semen, ſeed.

Seminale *folium*, ſeed leaves.

Semiteres *caulis*, half a cylinder, flat on one ſide, and round on the other.

Sempervirens *folium*, an ever-green leaf.

Sena *folia*, leaves growing in ſixes, as in galium ſpurium.

Senticoſæ, a briar or bramble, an order of plants in the fragmenta methodi naturalis of Linnæus.

Sepiariæ, a hedge, an order of plants in the fragmenta methodi naturalis of Linnæus.

Sericeum *folium*, a leaf whoſe ſurface is of a ſoft ſilky texture.

Serratum *folium*, a ſawed leaf.

Seſſile *folium*, a leaf growing immediately to the ſtem, without any foot-ſtalk.

Setæ, a briſtle, a ſpecies of pubeſcens, covering the ſurface of ſome plants.

Setaceum *folium*, leaves ſhaped like briſtles.

Sexus *plantarum*, plants are diſtinguiſhed by the ſex of their flowers, which are either male, female, or hermaphrodite.

Silicula, a little pod, a bivalve pericarpium, ſee claſs tetradynamia.

Siliqua, a pod, a pericarpium conſiſting of two valves, in which the the ſeeds are fixed alternately to each ſuture.

Siliquoſa, the ſecond order in the claſs tetradynamia.

Siliquoſæ, an order of plants in the fragmenta methodi naturalis of Linnæus.

Simplex *caulis*, a ſimple or ſingle ſtem.

Simpliciſſimus *caulis*, the moſt ſimple ſtalk.

Sinuatum *folium*, a leaf whoſe ſides are hollowed or ſcolloped.

Situs *foliorum*, the diſpoſition of leaves on the ſtem and branches, which are either ſtarry, by threes, oppoſite, alternate, ſcattered, or crowded.

Solidus *caulis*, a ſolid ſtalk or ſtem.

Solitarius *pedunculus*, when only one flower-ſtalk proceeds from the ſame part.

Solutæ *ſtipulæ*, looſe, oppoſed to adnatæ.

Spadix, the receptaculum of a palm, a pedunculus which proceeds from a ſpatha.

Sparſi *rami*, *pedunculi folia*, ſcattered without order.

Spatha, a ſpecies of calyx reſembling a ſheath.

Spathaceæ, like a ſheath, an order of plants in the fragmenta methodi naturalis of Linnæus.

Spatulatum *folium*, a leaf in form of a ſpatula, an inſtrument uſed to ſpread ſalve.

Species *plantarum*, the third ſubdiviſion in the Linnæan ſyſtem.

Spica, a ſpike, a ſpecies of infloreſcence reſembling an ear of corn.

Spica *ſecunda*, when the flowers all turn towards one ſide.

Spica *diſticha*, when the flowers are in two rows, and look two ways.

Spicula, a little ſpike.

Spinæ, thorns or rigid prickles.

Spinoſus *caulis*, ſtrong prickles, whoſe roots proceed from the wood of the ſtem, and not from the ſurface of the bark.

Spirales *cotyledones*, ſeminal leaves twiſted ſpirally.

Spithama, a ſpan, or ſeven Pariſian inches.

Splendentia *folia*, a ſhining leaf.

Squamoſa *radix*, a ſcaly root.

Squarroſum, rough, ſcaly, or ſcurfy.

Stamen, the filaments that ſuſtain the anthera.

Stamineus *flos*, flowers having ſtamina, and no corolla.

Statuminatæ, a prop, an order of plants in the fragmenta methodi naturalis of Linnæus.

Stella *folia*, leaves ſurrounding the ſtem, like the rays of a circle.

Stellatæ *ſeta*, a ſpecies of pubeſcens called briſtles, when they ariſe from a center in form of a ſtar, as in the meſembryanthemum barbatum.

Stellata *planta,* one of Mr. Ray's claſſes, the tetrandria monogynia of Linnæus.

Stellatæ, an order of plants in the fragmenta methodi naturalis of Linnæus.

Sterilis *flos,* a barren flower, maſculus of Linnæus.

Stigma, apex of the piſtillum.

Stimuli, ſtings.

Stipitatus *pappus,* a kind of trunk that elevates the down and connects it with the ſeed.

Stipula, one of the kinds of fulcra of plants, generally growing on each ſide of the baſe of the foot-ſtalks of leaves or flowers, and are either by twos, ſingle, deſiduous, abiding, adhering, looſe, on the inſide of the foot-ſtalks, or on the outſide.

Stipulares *glandulæ,* glands produced from ſtipulæ.

Stolo, a ſhoot, which running on the ſurface of the ground, ſtrikes root at every joint, as in fragaria and others.

Striatus *caulus, culmus,* &c. channeled ſtreaks, running lengthwiſe in parallel lines.

Strictus *caulis,* ſtraight ſtiff ſhoots.

Strigæ, ridges, rows.

Strobilus, a ſpecies of pericarpium, formed from an amentum, as the cone of the pine-tree.

Stylus, that part of the piſtillum which elevates the ſtigma from the germen.

Submerſum *folium,* when aquatic plants have their leaves ſunk under the ſurface of the water.

Subramoſus *caulis,* a ſtalk having few branches.

Subtrodundum, *folium,* a leaf almoſt round.

Subulatum *folium,* an awl-ſhaped leaf.

Succulentæ, juicy, an order of plants in the fragmenta methodi naturalis of Linnæus.

Suffrutex, an under ſhrub.

Sulcatus *caulus, culmus,* a ſtalk deeply furrowed lengthways.

Superflua *polygamia,* ſuperfluous, the ſecond order in the claſs ſyngeneſia.

Superus *flos,* when the receptacle of the flower ſtands above the germen.

Supra-axillaris *pedunculus,* the foot-ſtalk of a flower, whoſe inſertion is above the angle formed by the branch.

Supra-decompoſita *folia,* are compoſite leaves which have little leaves growing on a ſubdivided foot-ſtalk.

Supra-foliaceus, *pedunculus,* the foot-ſtalk of a flower inſerted into the ſtem immediately above the leaf.

Surculus, a twig, the ſtalks or branches of moſſes.

Syngeneſia, to generate together, the ninetheenth claſs in the ſexual ſyſtem.

T

Tegumentum, a cover, the perianthium and corolla.

Teres *caulis, folium,* a cylindrical ſtalk, or leaf.

Tergeminum *folium, compoſitum,* a leaf three times double, when a dichotomus petiolus is ſubdivided, having two foliola on the extremity of each diviſion.

Terminalis *flos,* flowers terminating a branch.

Terna *folia,* leaves in whorles by three's.

Ternatum *folium,* a chequered leaf, whoſe ſquares are of different colours.

Teſſellatum *folium,* a chequered leaf, whoſe ſquares are of different colours.

Tetradynamia, the ſuperiority or power of four, the fifteenth claſs in the ſexual ſyſtem.

Tetragonus *caulis,* a four-cornered or ſquare ſtalk.

Tetragynia, four females, the fourth order of ſome of the claſſes in the ſexual ſyſtem.

Tetrandria, four males, the fourth claſs in the ſexual ſyſtem.

Tetrapetala *corolla,* a flower conſiſting of four petals.

Tetraphyllus *calyx,* a flower-cup conſiſting of four leaves.

Tetraſperma *planta,* producing four ſeeds.

Thalamus, a bed, the receptacle.

Theca, a ſheath.

Thyrſus, a ſpike like a pine-cone.

Tomentoſus *caulis, folia,* a ſtalk and leaf covered with a whitiſh down like wool.

Tomentum, a ſpecies of pubeſcence, covering the ſurface of ſome plants of woolly or downy ſubſtance.

Toroſum *pericarpium,* brawny protuberances, like the ſwelling of the veins when a pericarpium is bunched out by the incloſed ſeeds.

Torta *corolla,* when the petals of a flower are twiſted, as in nerium.

Tortilis *ariſta,* awns or beards of corn twiſted like a ſcrew.

Tranſverſum *diſſepimentum,* when the diſſepiments are at right angles with the ſides of the pericarpium.

Trapeziforme *folium,* a leaf having four prominent angles, whoſe ſides are neither equal or oppoſite.

Triandria, three males, the third claſs in the ſexual ſyſtem.

Triangulare *folium,* a triangular leaf.

Tricocca *capſula,* a capſule with three cells, and a ſingle ſeed in each cell.

Tricoccæ, an order of plants in the fragmenta methodi naturalis of Linnæus.

Tricuſpidata, three pointed.

Trifidum *folium,* a leaf divided into three linear ſegments, having ſtraight margins.

Triflorus *pedunculus,* a foot-ſtalk bearing three flowers.

Trigonus *caulis,* a three-ſided ſtalk.

Trigynia, three females, the third order in ſome of the claſſes.

Trihillatæ, a ſeed having three eyes.

Trijugum *folium,* a winged leaf, with three pair of foliola.

Trilobum *folium,* a leaf having three lobes.

Trinervum *folium,* a leaf having three ſtrong nerves running from the baſe to the apex.

Trioecia, three houſes, the third order in the claſs polygamia in the ſexual ſyſtem.

Tripartitum *folium,* a leaf divided into three parts down to the baſe.

Tripetala *corolla,* a flower conſiſting of three petals.

Tripetaloideæ, three petaled, an order of plants in the fragmenta methodi naturalis of Linnæus.

Triphyllus *calyx,* a cup conſiſting of three leaves.

Tripinnatum *folium, compoſitum,* a leaf having a triple ſeries of pinna, or wings.

Triplinerve *folium,* a leaf having three nerves running from the baſe to the apex.

Triquetrum *folium caulis,* leaves and ſtalks having three plain ſides.

Triſperma, three-ſeeded, as in euphorbia.

Triternatum *folium, compoſitum,* a compound leaf when the diviſions of a triple petiolus are ſubdivided into three's.

Trivalve *pericarpium,* a pod conſiſting of three valves.

Truncatum *folium,* a leaf having its apex as it were cut off.

Truncus, the body or ſtem of a tree.

Tuberculatus, having pimples or tubercles.

Tuberculum, a little pimple.

Tuberoſa *radix,* a tuberous or knobbed root.

Tubulatum *perianthium,* tubural flowers, as in the claſs didinamia.

Tubuloſi *floſculi,* tubular florets nearly equal, one of the three diviſions of compound flowers.

Tubus, a tube, the lower and narrow part of a monopetalous flower.

Tunicatus *radix,* a ſpecies of bulbus root, having coats lying one over another from the centre to the ſurface, as in the onion, tulip, &c.

Turbinatum *pericarpium,* a kind of pod ſhaped like a top, narrow at the baſe and broad at the apex.

Turgidum *legumen,* ſwollen, puffed out, as in ononis.

Turio, the young buds, or ſhoots of pines.

V

Vaginales, ſheathed, an order of plants in the fragmenta methodi naturalis of Linnæus.

Vaginans *folium,* a leaf like a ſheath, whoſe baſe infolds the ſtem.

Valvula, a valve, a partition of the external cover of that ſort of pericarpium called capſula.

Vegetabilia, one of the three kingdoms of nature.

Venoſum *folium*, the veins which run over the whole ſurface of a leaf.

Ventricoſa *ſpica*, a ſpike narrowing at each extremity, and bellying out in the middle.

Ventriculoſus *calyx*, a flower cup bellying out in the middle, but not in ſo great a degree as ventricoſus.

Vepreculæ, a briar or bramble, an order of plants in the fragmenta methodi naturalis of Linnæus.

Verrucoſa *capſula*, a capſule having little knobs or warts on its ſurface.

Verſatilis *anthera*, when the anthera is fixed by the middle on the point of the filament, and ſo poiſed as to turn like the needle of a compaſs.

Verticalia *folia*, leaves ſo ſituated that their baſe is perpendicular above the apex.

Verticillati *rami*, *flores*, *folia*, branches, flowers, or leaves ſurrounding the ſtem, like the rays of a wheel.

Verticillatæ, an order of plants in the fragmenta methodi naturalis of Linnæus.

Verticillus, a ſpecies of infloreſcence, in which the flowers grow in whorles, as in mentha.

Veſicula, a little bladder.

Veſicularis *ſcabrities*, a kind of glandular roughneſs, reſembling veſiculæ.

Vexillum, a ſtandard, the upright petal of a papilionaceous flower.

Villoſus *caulis folium*, a ſtalk, or leaf, covered with ſoft hairs.

Virgatus *caulis*, ſtalks ſhooting out; ſlender ſtraight branches or rods.

Viſcidum *folium*, a leaf whoſe ſurface is clammy.

Viſcoſitas, glewy, clammy.

Uliginoſa *loca*, boggy places.

Umbella, an umbel or umbrella.

Umbellatus *flos*, an umbellated flower, as in pentandria digynia.

Umbellula, a little umbel.

Umbilicatum *folium*, a peltate leaf, ſhaped like a navel, at the inſertion of the foot-ſtalk.

Uncinatum *ſtigma*, a hooked ſtigma.

Undatum *folium*, a waved leaf, whoſe ſurface riſes and falls in waves towards the margin.

Undulata *corolla*, a flower whoſe petals are waved.

Unguis, a nail, or claw, that part of a petal that is joined to the receptacle.

Unicus *flos*, one flower.

Unicus *radix*, a ſingle root.

Uniflorus *pedunculus*, one flower on a foot-ſtalk.

Unilateralis *racemus*, a bunch of flowers growing on one ſide.
Univerſalis *umbella*, an univerſal umbel.
Volva, the membranaceous calyx of the fungi.
Volubilis *caulis*, a twining ſtalk.
Urceolata *corolla*, a pitcher-ſhaped flower.
Urens *caulis folium*, a leaf or ſtalk, burning, ſtinging, as nettles.
Utricula, a ſpecies of glandular, ſecretory veſſels, on the ſurface of various plants.
Vulgaris, common, the trivial name of many p[illegible]nts in the books of old botaniſts.

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